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THE SEROLOGIC DIAGNOSIS OF RHEUMATOID ARTHRITIS

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• *A new test, involving the use of a suspension of latex particles, was applied to 1,606 samples of serum from 907 patients whose clinical diagnoses, whether of rheumatic disease or otherwise, had been established. The latex particles in stock suspension had a fairly uniform mean diameter of 1.17 microns. For the test they were mixed with borate buffer and gamma globulin. When the serum to be tested is added to this mixture it may or may not cause aggregation of the particles. A positive test is indicated by discernible aggregation, which can be read with the naked eye. Of 291 patients who met the clinical criteria for the diagnosis of rheumatoid arthritis, 245 (84.2%) showed positive latex fixation tests; the 46 instances of false-negative reactions have been studied. Of 414 patients with rheumatic disease other than rheumatoid arthritis, 399 (96.3%) gave negative latex fixation reactions; the 15 false-positive reactions have likewise been studied. The test was as reliable as are the various sheep cell agglutination tests now used for serologic detection of rheumatoid arthritis, and it had the advantage of being simple, very inexpensive, fast, and clinically useful.*

Despite some opinions to the contrary, the diagnosis of rheumatoid arthritis in clinical practice remains very often a perplexing and vexing problem. The truth of this statement was well illustrated when the American Rheumatism Association found it necessary to set up a committee on diagnostic criteria. This committee, headed by Dr. Marion Ropes of Boston, carried out its very difficult assignment in a most thorough and commendable manner, but still felt compelled to list a set of 11 criteria from which any 5 would permit a "definite diagnosis."[1] Less certain diagnoses were permitted with less criteria, and the categories of "probable rheumatoid arthritis" and "possible rheumatoid arthritis" reveal rather pathetically a weakness and lack of certainty in the diagnosis of rheumatic diseases generally and rheumatoid arthritis specifically. The committee's efforts have already been recognized to be of inestimable value but leave no doubt of the great need for laboratory diagnostic aids which are simple, practicable, and reliably accurate to a statistically significant degree.

The erythrocyte-sedimentation rate is a time-honored and well-established laboratory aid in the diagnosis of rheumatoid arthritis, but it is wholly lacking in specificity. More recently other substances (generally referred to as acute phase reactants) such as the nonglucosamine polysaccharides and hexosamines have been reported to be elevated in rheumatoid arthritis, but these too are nonspecific, being increased in rheumatic fever and other allied diseases.[2] Probing into the area of serologic reactions led to the development of the antistreptolysin titer, which is notoriously negative in rheumatoid arthritis, the hemolytic Streptococcus agglutination test, which is not practicable and is largely lacking in any degree of specificity, and more recently the sensitized sheep cell agglutination reaction.[3] Extensive studies of this last named have led to an awareness of the existence of a specific factor in the serum of patients with rheumatoid arthritis.[3a] The refinements of the sensitized sheep cell agglutination test have decreased the percentage of false-negative results but proportionately increased the percentage of false-positive findings. The demonstration of an inhibitor of this hemagglutination by the Ziff group[3c] as well as by Heller and associates[3b] has materially enhanced the specificity and sensitivity of this test. Nevertheless, the test is extremely cumbersome, expensive, and completely impractical for routine use as a diagnostic aid in clinical rheumatology.

At the meeting of the American Rheumatism Association in Chicago in June, 1956, Plotz and Singer[4] reported the ingenious adaptation of polystyrene latex particles, which are of a remarkable constancy in cali-

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ber, to an agglutination procedure; this appears to offer great promise as a serologic diagnostic test in rheumatoid arthritis. They reported a significantly high degree of accuracy, with few false-positive results. After using their test for a short time, we were able to confirm in general the work of Plotz and Singer and came to realize the very great potential of their test as a routine laboratory aid so necessary to the clinical diagnosis of rheumatoid arthritis. Rheins modified the technique to such an extent that only a drop of serum was needed and duration and degree of incubation were reduced; the test could be read grossly and thus became an easily applied method for general diagnostic survey in rheumatic diseases. This was reported by this laboratory in discussion at the American Rheumatism Association Interim Session in Bethesda, Md., Nov. 30, 1956.[8] We have now extended our studies to a sampling of patients of sufficient number to be statistically significant, and we consider the test to be of such great importance and value to practitioners everywhere that we are reporting these studies in detail here.

Method

To date, 2,000 serum samples have been tested from 1,208 patients in the rheumatic disease laboratory of the Ohio State University Health Center. Three hundred ninety-four serum samples from 301 patients are excluded from the tables to follow because the necessary information was unobtainable or inadequate to establish diagnosis. The remaining 1,606 samples have been collected from 907 patients whose clinical diagnosis, of rheumatic disease or otherwise, is established. All patients with rheumatic diseases have been followed by one or more of us in the arthritis division.

In all cases, a definite commitment as to clinical diagnosis was made by at least one of us prior to the performance of the latex fixation test, so that no bias in clinical diagnosis was produced by positive or negative serologic results. Also, the tests were performed by technicians unfamiliar with the patients' clinical diagnoses. In addition, serum results and titers were recorded by a number rather than by name by the testing technician.

Whenever possible, a Wintrobe sedimentation rate was performed on the same sample of whole blood from which the serum was tested by the drop latex fixation method. Many of the 1,606 serum specimens are repeat samplings on patients after intervals of treatment.

Classification

The 907 patients have been divided by clinical diagnoses into rheumatic and nonrheumatic groups (table 1). In the rheumatic group are included all patients whose major or minor complaint lay in a primary musculoskeletal disorder. The following clinical standards were defined prior to evaluation of the test:

Rheumatoid Arthritis.—American Rheumatism Association criteria [1] are followed insofar as possible. Included are active and inactive cases, treated and untreated, of any stage or grade; whether unaffected, partially suppressed, or completely suppressed by treatment. Rheumatoid spondylitis is excluded.

Rheumatoid Spondylitis.—This condition was diagnosed by clinical and minimal x-ray criteria. Active and inactive ("burned out") cases are included. Also included for purposes of this paper are three patients with rheumatoid spondylitis in whom peripheral arthritis later developed.

Osteoarthritis.—This disease was symptomatic, with or without x-ray changes. Included in this group are a few patients with well-defined post-traumatic arthritis. Excluded, for purposes of this paper, are those patients with associated primary periarticular fibrositis.

Fibrositis.—Periarticular fibrositis, localized or generalized, is a symptomatic soft tissue disease of unknown or traumatic origin. Included are patients with syndromes of known reflex origin such as shoulder-hand syndrome from coronary artery disease and carcinoma of the lung.

Lupus Erythematosus.—In this group are included only those patients with established clinical disseminated lupus erythematosus, either in remission or in relapse. All but one have had positive L. E. cell preparations by the Hargraves technique on one or more occasions. There are no patients with rheumatoid arthritis in this group.

Diffuse Collagen Disease.—The five patients in this group cannot be given a more correct diagnosis by clinical means. All have been seriously ill with generalized connective tissue disorder, of which the arthropathy has been the least clinical concern.

Infectious Arthritis.—These patients had acute purulent arthritis without pulmonary disease or penetrating wound to the joint.

Postgonococcic Arthritis.—These patients developed sterile, purulent arthritis following culturally-proved gonococcic urethritis and vaginitis. In all instances the arthritis responded to definitive antimicrobial therapy, and rheumatoid arthritis has not, thus far, appeared in any patient.

Miscellaneous Diseases.—Gouty arthritis, rheumatic fever (active), scleroderma, periarteritis nodosa, and Charcot joint require no further explanation of criteria for diagnosis. All were established on proper clinical and laboratory grounds.

In the nonrheumatic group are those patients with established clinical diagnoses other than in the rheumatic disease group. Among these, however, are patients with diseases often accompanied by arthralgias (ulcerative colitis, osteoporosis, fracture into joint); diseases associated with abnormalities of serum proteins (hepatic cirrhosis, multiple myeloma); diseases comonly included among the collagen disorders (chronic glomerulonephritis, rheumatic heart disease [inactive]); and specific chronic infections (syphilis, pulmonary tuberculosis) known to produce bizarre results in some nonspecific serologic tests. In 14 patients the diagnoses were unestablished, but were of nonrheumatic disease. Seven patients were considered to have no disease.

Technique

The technique of the drop latex fixation test is reported elsewhere [9] but is reviewed here in brief for purposes of clarity: To prepare the antigen, mix 0.1 ml.

of stock suspension of latex particles (mean diameter 1.17 μ) with 9.5 ml. of borate buffer (pH 8.2) in a test tube. Add 0.5 ml. of gamma globulin (poliomyelitis immune globulin containing 150 mg. of gamma globulin was diluted so that each milliliter contained the recommended 5 mg. per milliliter). Mix by inverting several times and store in refrigerator until needed. (Usually, the antigen is used but one day; however, we have found it to be unchanged on the second and even the third day. Regardless of the length of storage, it should be mixed by inverting just prior to use.)

The initial dilution of all test serums is 1:20. As a routine procedure this is accomplished by mixing 1 drop of serum (no previous treatment necessary) into 1 ml. of the borate buffer. Frozen serum may be used. Serum should be frozen if it is not to be used immediately.

Two drops of each serum (1:20) to be tested are added to small culture tubes (12 by 75 mm.) with disposable capillary pipets (these were found to be of fairly uniform bore—they should be long enough, 5 in., to reach the bottom of the tubes). Two drops of antigen are now added to each tube. After mixing by shaking the test tube rack, incubate the tests in a 37 or 56 C water bath for 30 minutes. The tubes are centrifuged (angle centrifuge) at approximately one-third speed (1,000 rpm for one minute). As soon as the centrifuge speed reaches the one-third setting, the centrifugation is discontinued and the tubes are removed and read by slanting them and observing under reflected light. A positive test is indicated by discernible aggregation, a negative test by absence of aggregation. Two controls are included: (1) 2 drops of a known negative serum (1:20) plus 2 drops of antigen, and (2) 2 drops of buffer plus 2 drops of antigen. The serum control was found to be extremely valuable, since the 1:20 dilutions of test serum have a viscosity greater than that of the buffer and lead to dubious results.

All serums founds to be positive or doubtful are titrated. For each titration, 9 tubes (12 by 75 mm.) are placed in a rack. Two drops of the buffer are added to each of the tubes but the first. Two drops of the 1:20 test serum are added to the first tube (this permits an additional check on the screening procedure) and 2 drops to the second tube in the series. The contents of the second tube are mixed by agitating the tube (shaking), and 2 drops of the 1:40 dilution are transferred to the third tube. The mixing and transferring are repeated throughout the series. Two drops from the last tube are discarded. The serum dilutions range from 1:20 through 1:5,120. Two drops of the antigen are added to each tube, and the incubation (tubes are shaken first) is done as before. Controls are included. After centrifugation, the last serum dilution giving demonstrable aggregation (compare with controls) is the titration end-point. For purposes of screening, all patients with a positive result in the first tube (dilution 1:20) are considered to have a positive latex fixation test.

TABLE 1.—*Results of Latex Fixation Test in 907 Patients*

Diagnosis	No. Positive	No. Negative	Total No.	% Positive
Rheumatoid arthritis	245	46	291	84.2
Rheumatic disease without rheumatoid arthritis	15	399	414	3.6
Nonrheumatic diseases	11	191	202	5.4
	271	636	907	

TABLE 2.—*Data on Forty-six Patients with Rheumatoid Arthritis Who Had False-Negative Latex Fixation Tests*

Case No.	Stage	Class	Activity or Grade	Current Treatment	Sed. Rate (Wintrobe)	Serums Tested, No.
1	1*	2	1	Steroids	14	1
2	1	1	Prodromal	Steroids	8	1
3	1	2	1	Steroids	10	1
4	1	1	1†	Steroids	7	1
5	1	1	1	Salicylates	26	1
6	1	1	Inactive	None	10	1
7	1	1	2	Gold	49	3
8	1	1	1	Gold	...	1
9	1	2	2	Gold	55	2
10	1	1	1	Steroids	...	3
11	1	1	1	None	...	1
12	1	1	1	Steroids	12	2
13	1‡	1	1	None	...	1
14	1	1	1	Salicylates	...	2
15	2	3	3	Steroids	32	2
16	2	1	1	Gold	50	3
17	2	1	2	Gold	...	4
18	2	2	2	Steroids	22	1
19	2	3	2	Steroids	58	4
20	3	2	2	Gold	40	3
21	3	2	2	Steroids	...	1
22	4	4	Burned-out	Steroids	21	1
23	4	1	Inactive	None	6	1
24	4	1	1	None	15	1
25	2	3	2	Steroids and gold	50	1
26	1	1	1	Salicylates	...	1
27	2	2	3	Gold	42	1
28	1	1	2	Multiple	31	1
29	1	1	2	Steroids	58	1
30	1	1	2	Multiple	...	1
31	4	4	Burned-out	Steroids	32	1
32	3	3	2	Multiple	36	1
33	4	3	2	Multiple	21	1
34	1	1	1	Steroids	4	1
35	3	2	2	Steroids	46	1
36	1	1	2	Steroids	20	1
37	2	1	2	Steroids	20	1
38	1	1	2	Steroids	23	1
39	3	2	2	Steroids	36	1
40	1	1	1	Salicylates	16	1
41	2	2	2	Steroids	45-20	2
42	2	2	2	Steroids	...	1
43	2	2	2	Steroids	...	1
44	4	4	1	Salicylates	5	1
45	4	3	1	Gold	21	1
46	3	1	1	Gold	6	1

* Symptoms of rheumatoid arthritis without objective evidence.
† Wrist joint swelling without other objective evidence of disease.
‡ No objective signs of rheumatoid arthritis.

Results in Rheumatic Disease Group

Rheumatoid Arthritis.—Of 705 patients considered to have rheumatic disease (table 1), 291 met the clinical criteria for diagnosis of rheumatoid arthritis. Of the 291, 245, or 84.2%, showed positive latex fixation tests. This compares favorably with the results of others using various sheep cell agglutination techniques for the serologic identification of rheumatoid arthritis.[6]

The false-negative reactions among the rheumatoid arthritis group are tallied individually in table 2. Included are patients with stage and class of disease from 1 to 4. In many cases, however, the disease is of low grade of activity, inactive, or completely suppressed by steroids or gold therapy. In some instances, this is based on clinical evidence alone. In others,

however, concomitantly determined sedimentation rates are relatively low or normal. (One should not conclude, however, that adequate suppression by steroid or gold therapy will necessarily inhibit the latex fixation test in a patient with active rheumatoid arthritis. Many of the patients with positive latex fixation tests have adequate suppression of objective activity by therapy. In general, however, the greater the activity, duration, and extent of disease, the higher the titer of the latex fixation test.)

TABLE 3.—*Results of Latex Fixation Tests in 414 Patients with Rheumatic Diseases Other than Rheumatoid Arthritis*

Diagnosis	No. Positive	No. Negative	Total No.
Osteoarthritis	4	147	151
Fibrositis	5	156	161
Rheumatoid spondylitis	0	30	30
Disseminated lupus erythematosus	2	15	17
Gouty arthritis	0	16	16
Rheumatic fever (adults)	1	12	13
Diffuse collagen disease	1	4	5
Scleroderma	1	2	3
Postgonococcic arthritis	0	3	3
Infectious arthritis	0	2	2
Charcot's neuroarthropathy	0	2	2
Psoriatic arthropathy	0	4	4
Reiter's disease	0	1	1
Serum sickness (TAT)	0	3	3
Periarteritis nodosa (fatal)	1	1	2
Tuberculous spondylitis	0	1	1
Totals	15	399	414

Also having the negative reactions were patients with atypical or mild disease (cases 1, 3, 6, 13, in table 2) and patients with early or prodromal rheumatoid arthritis (cases 2, 4). Thus, in some of these, the diagnosis of rheumatoid arthritis could be questioned.

Rheumatoid Spondylitis.—Patients with proved rheumatoid spondylitis were included in this group irrespective of past or present associated peripheral joint disease. Although 3 of the 30 have now some involvement of distal joints by what is clinically active rheumatoid arthritis, no patient in this entire group has had a positive latex fixation test. Most have had repeated tests, with negative results. This lends some support to the thesis that the two diseases are at least serologically different. Similar results have been reported by others with the sheep cell agglutination technique.[7]

Osteoarthritis.—Of 151 patients with clinical diagnosis of osteoarthritis, 4 had positive latex fixation tests. It is not known whether the false reactors represent failure of the test or incorrect diagnoses (table 4).

Fibrositis.—There were 5 false-positive reactors in 43 patients with fibrositis. The same questions in clinical and serologic evaluation exist in these patients as in the osteoarthritis class (table 4).

Disseminated Lupus Erythematosus.—There is apparently a distinct serologic separation of patients with rheumatoid arthritis from those with disseminated lupus erythematosus. In this respect the drop latex fixation test appears to offer a distinct advantage over the known sheep cell agglutination techniques, in which false-positive results frequently occur. However, the two false-positive reactions in this group occurred in patients who clearly did not have rheumatoid arthritis.

Scleroderma.—Of the three patients with scleroderma, two, with inactive nonprogressive distral scleroderma, had a negative latex fixation test. The last, a young woman with clinically active but slowly progressive scleroderma, who has never had any arthropathy, had a strongly positive latex fixation test (dilution 1:5,120) (table 4). This, of course, requires further investigation, no other comment being possible.

Others.—Patients with gouty or postgonococcic arthritis, infectious arthritis, syphilitic neuroarthropathy, psoriatic arthropathy, Reiter's disease, tuberculous spondylitis, serum sickness, and diffuse collagen disease all had negative latex fixation tests consistently. The numbers of all but the group with gouty arthritis are too small to warrant inference. It is significant, however, that the most desperately ill patients with unclassified diffuse collagen disease involving all fibrous structures, including synovial tissues, showed negative latex fixation tests. None are dead, none are well, and none have settled down into clinically recognizable rheumatoid arthritis.

Results in Nonrheumatic Disease Group

Many patients in the nonrheumatic group were selected because of clinical association with the rheumatic diseases, as in rheumatic heart disease, chronic ulcerative colitis, chronic glomerulonephritis, osteoporosis, and healing stage of fracture into a joint. Others were chosen because of known associated serologic abnormalities; i. e., multiple myeloma, cirrhosis of the liver, histoplasmosis, and syphilis. The remainder are patients chosen at random from inpatient services. One hundred ninety-one of the 202

TABLE 4.—*Titer of False-Positive Latex Fixation Test in Patients with Rheumatic Diseases Other than Rheumatoid Arthritis*

Case No.	Diagnosis	Titer of Latex Fixation
1	Scleroderma	1:5,120
2	Osteoarthritis	1:40
3	Osteoarthritis	1:40
4	Osteoarthritis	1:20
5	Osteoarthritis	1:40
6	Osteoarthritis	1:40*
7	Fibrositis	1:160
8	Fibrositis	1:20†
9	Fibrositis	1:20
10	Fibrositis	1:80
11	Fibrositis	1:40
12	Rheumatic fever	1:20
13	Diffuse collagen disease	1:80
14	Disseminated lupus erythematosus	1:640
15	Disseminated lupus erythematosus	1:640
16	Periarteritis nodosa	1:80

* Weak reaction.
† Repeat test negative.

patients in this group had negative drop latex fixation tests. Two with positive reactions had a positive serologic test for syphilis (STS) (table 5). Both had histories of adequate treatment for presumed latent syphilis. (Five patients found to have a positive STS with unassociated disorders had negative latex fixation tests. This will be discussed later.)

The remaining false-positive reactors in this group include a patient with cerebrovascular accident, one with generalized symptomatic osteoporosis, and the mother of one of the young patients with lupus erythematosus. (This woman has had arthralgias and may

have had rheumatoid arthritis in the past.) The overall significance of the findings in the nonrheumatic group lies in the low incidence of false-positive reactors among the hospital population, even though chosen because of clinical or serologic similarity to patients with rheumatoid arthritis.

TABLE 3.—*Diagnoses of Patients with Nonrheumatic Disease Who Had Negative Latex Fixation Tests*

Heart disease		**36**
Rheumatic heart disease, inactive	14	
Arteriosclerotic heart disease	9	
Hypertensive cardiovascular disease	10	
Dissecting aortic aneurysm	1	
Idiopathic pericarditis	2	
Endocrine disorders		**17**
Diabetes mellitus, uncontrolled	5	
Thyrotoxicosis	3	
Postmenopausal osteoporosis	7	
Hypothyroidism	1	
Menopause	1	
Gastrointestinal disorders		**28**
Chronic gastritis	3	
Carcinoma of esophagus, stomach, colon	5	
Hepatic cirrhosis	8	
Ulcerative colitis	9	
Gastrointestinal hemorrhage	1	
Hepatitis, infectious	2	
Renal disease		**7**
Chronic glomerulonephritis	3	
Chronic pyelonephritis	4	
Hematological disorders		**11**
Multiple myeloma	2	
Sickle cell crisis	1	
Infectious mononucleosis	1	
Drug sensitivity	1	
Splenomegaly	2	
Thrombocytopenic purpura	2	
Eosinophilia, cause unknown	1	
Schönlein-Henoch purpura	1	
Pulmonary disease		**14**
Chronic bronchitis	3	
Histoplasmosis	1	
Carcinoma of lung	1	
Pneumonia, lobar, bacterial	3	
Spontaneous pneumothorax	1	
Emphysema, obstructive	3	
Bronchiectasis	1	
Asthma	1	
Miscellaneous		**83**
Fracture into joint	3	
Chronic neurodermatitis	5	
Acute respiratory disease	14	
Subacute bacterial endocarditis	3	
Rectal bleeding	1	
Mother of patient with lupus erythematosus	1	
Functional uterine bleeding	1	
Myoma of uterus	1	
Shigellosis, acute	1	
Idiopathic porphyria	1	
Thrombophlebitis	3	
Cerebral thrombosis	1	
Psychotic habitus with contractures	3	
Chlorpromazine (Thorazine) hydrochloride jaundice	1	
Discoid lupus erythematosus	2	
Premenstrual edema	1	
Pemphigus vulgaris	1	
Ruptured intervertebral disk	1	
CNS disease with seizures	1	
Spondylolisthesis	1	
Exfoliative dermatitis	2	
Erythema multiforme	2	
Urticaria, chronic	1	
Anxiety state	4	
No disease	7	
Diagnosis undetermined	14	
Neurosyphilis, treated (paresis)	1	
Positive serology, syphilitic status undetermined	4*	
Monostatic fibrous dysplasia	1	
Pregnancy	2	
Hyperemesis gravidarum	1	
Fever of unknown origin	2	

* Recorded also under another primary diagnosis.

Comment

For a test to meet the needs of physicians as an aid to clinical diagnosis or estimation of disease state, it must be simple, short, easy to teach and perform, accurate, sensitive, specific, reproducible, and inexpensive to initiate and carry out. In addition, if such a test is considered for mass screening or survey work, the test must be stable for frozen serums; it must be adaptable to running large numbers of serums in unit time; and it must be reproducible not only by different technicians in the same laboratory but by other technicians in other laboratories. The drop latex fixation test meets all these requirements except possibly sensitivity. However, the 16% failure of detection occurred in some early, inactive, and thoroughly suppressed cases of rheumatoid arthritis and only in an occasional instance of full-blown generalized, active, unsuppressed disease. The reasons for these failures are unknown, but are experienced to a like degree by those using standard sheep cell techniques.

The number of patients having false-positive tests is low (26 in 616). Fifteen of these come from the nonrheumatoid rheumatic disease group (totalling 414)

TABLE 6.—*Data on Patients with Nonrheumatic Disease Who Had False-Positive Latex Fixation Tests*

Case No.	Diagnosis	Titers of Latex Fixation
1	Nonrheumatic, mother of patient with lupus erythematosus	1:160*
2	Cerebrovascular disease	1:320
3	Osteoporosis, generalized	1:5,120 1:320
4	Latent syphilis, treated; positive STS	1:80
5	Latent syphilis, treated; positive STS	1:80
6	Spondylolisthesis	1:40
7	Sulfonamide reaction	1:20
8	Chlorpromazine jaundice	1:80*
9	Discoid lupus erythematosus	1:640
10	Sickle cell crisis	1:80*
11	Diabetic neuropathy	1:20 (weak)

* Three repeat tests were negative.

and 11 from the nonrheumatic group (totalling 202), suggesting that the incidence of false-positive reactions may not be greater in those with nonrheumatoid rheumatic disease than in a general hospital population.

Since the number of adults with active rheumatic fever was small, serums were obtained from 22 children hospitalized because of active rheumatic fever. These patients were not examined by either of us, but the serums were obtained for a separate study for validation of the serologic differentiation of rheumatoid arthritis and rheumatic fever. The absence of a single positive latex fixation test in this group is noteworthy.

Earlier, allusion was made to positive latex fixation tests occurring in persons with known syphilis with one or more STS being positive. Initial studies have failed to reveal significant correlation between serum reactivity to the antigens used for the STS and the latex antigen.

In addition, 5 of 100 serums from patients with active pulmonary tuberculosis were positive by latex fixation technique. Neither of these disorders should present any problem to the clinician in distinguishing them from rheumatoid arthritis, unless the rheumatic

disease and infectious process coexist. These findings are most interesting when considered in the light of the basic mechanism of the latex fixation test, about which literally nothing is known. An interesting sidelight which should be investigated further is the occurrence of a positive latex fixation test in some cases of serologically proved syphilis. There are two instances of overlap of lupus, positive STS, and positive latex fixation test in this series.

Summary and Conclusions

The drop modification of the latex fixation test has been performed as a screening procedure on 2,000 serums from 1,208 patients. Of 291 patients with rheumatoid arthritis, 245 had positive serologic tests, for an over-all efficiency of 84.2%. There were 3.6% false-positive results among the 414 patients with nonrheumatoid rheumatic disease. None of these occurred in patients with rheumatoid spondylitis, gouty arthritis, or infectious arthritis due to any cause. False-positive reactions occurred rarely in disseminated lupus erythematosus, acute rheumatic fever, and in unclassified diffuse collagen disease. These results compare favorably with those reported for the various sheep cell agglutination tests for serologic detection of rheumatoid arthritis.

Because of ease, simplicity, speed, specificity, relative sensitivity, inexpensiveness, and adaptability to large volume work, the drop latex fixation test has been used in this study to determine its value as a single laboratory diagnostic procedure in rheumatoid arthritis. It appears that the drop latex fixation test offers the only convenient specific laboratory aid to clinical evaluation of presence or absence of rheumatoid arthritis. Further studies as to the mechanism and adaptability of the test are in progress. Work is presently being done to adjust the test to encompass the more deliberate examination of the so-called false-negative serums. If the test is found to be as consistently reliable as it appears thus far to be, its use in large clinical studies and perhaps mass-screening procedures will be indicated.

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6. Footnotes 3*b* and *c* and *e*.

7. Footnotes 3*c* and *e*.

Chlorpromazine Toxicity.—Chlorpromazine-induced jaundice is of the intrahepatic cholestatic type, and there is usually no associated hepatocellular damage. Nevertheless, several deaths from chlorpromazine hepatitis have been reported. Since the clinicopathologic syndrome of primary intrahepatic cholestasis may have diverse causes, the jaundice may offer considerable difficulty in differential diagnosis. Jaundice may occur several weeks after discontinuing the drug, and it may persist for many months, irrespective of the amount of drug given. In cases of obstructive jaundice in which careful questioning of the patient discloses recent intake of even small amounts of chlorpromazine, operation should be deferred until a complete investigation is made to rule out the possibility of drug toxicity. The transaminase test is valuable in excluding the possibility of concurrent exposure of patients to other hepatotoxic or icterogenic agents or conditions. Increased transaminase activity has been found to precede the development of jaundice from chlorpromazine. During the first two months of therapy . . . a urinalysis [should] be done for bile twice a week, and . . . frequent white cell counts [should] be made during this period . . . especially when fever, sore throat, or skin eruption suggests the presence of sensitivity to the drug. If the blood serum appears icteric, serum bilirubin, alkaline phosphatase activity, and other liver functions studies are indicated, as all cases of toxic reactions should be carefully studied. However no laboratory data can be substituted for careful, continued, clinical observation of the patient. It would seem wise to avoid chlorpromazine therapy when infectious hepatitis is endemic, in the presence of liver disease, in malnourished patients, and when other potentially hepatotoxic agents have been used.—Lieut. Col. W. L. Craddock, M.C., U. S. Army (Res.), Toxic Effects of Chlorpromazine, *United States Armed Forces Medical Journal*, December, 1956.

ETIOLOGY OF THE TRANSIENT CEREBRAL STROKE

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• *Hemiplegia, monoplegia, hemianesthesia, aphasia, and visual disturbances are all manifestations of sudden, transient focal cerebral vascular disturbances. Rhesus monkeys, whose pial vessels are similar to those of man, were studied to clarify the etiology of these transient cerebral strokes. The results of the experimental studies suggest it is unlikely that cerebral angiospasm can occur, but rather that the transient cerebral stroke is due to cerebral thrombosis, embolism, hemorrhage, or vascular insufficiency. The concept of cerebral vascular insufficiency which explains many of the transient neurological disorders is caused by disturbances of the systemic circulation in the presence of cerebral artery narrowing.*

The etiology of sudden, transient focal cerebral vascular disturbances has been the subject of considerable controversy.[1] Such disorders include hemiplegia, monoplegia, hemianesthesia, aphasia, and visual disturbances. They occur suddenly and often disappear rapidly, sometimes within a few minutes. Consciousness is frequently maintained. In the absence of other obvious causes for these attacks, it has been convenient in the past to attribute them to cerebral angiospasm.

Recent investigations,[1] however, have raised serious doubt concerning the ability of cerebral arteries to contract. It is, of course, well known that many visceral and other arteries are capable of constriction in response to various stimuli. These vessels are supplied with adequate musculature and innervation which function to narrow the arterial caliber. The cerebral arteries, however, as shown by Pickering,[1b] are lacking in vasoconstrictor innervation and musculature. It is difficult to see, therefore, how contraction of these vessels can occur. Hence, Pickering suggested that small focal cerebral vascular disturbances might be embolic or thrombotic in origin. Others have suggested that "small strokes" may be the result of minute cerebral hemorrhages. The duration of dysfunction in such episodes would presumably be related to the adequacy of the local collateral circulation.

Despite the evidence presented by Pickering, many clinicians still regard cerebral angiospasm as the mechanism responsible for small strokes. The presumed presence of cerebral angiospasm is the basis for anesthetizing the stellate ganglion in some instances of cerebral vascular disorders. This procedure is supposed to abolish or prevent cerebral vasospasm by blocking vasoconstrictor impulses to the affected vessels. However, it has been postulated that anesthetization of the stellate ganglion improves the cerebral circulation by its effect on the systemic circulation or the extracranial arteries rather than by abolishing spasm of the intracranial vessels.

Because of the difference of opinion concerning the actuality of cerebral angiospasm, it was decided to investigate this question experimentally. The animals chosen for this study were rhesus monkeys, whose pial vessels are similar anatomically to those of man. Our results differ from those of Forbes and co-workers,[2] who mainly observed dogs and cats. However, the interpretation and statistical significance of their results have been questioned.[1a] We used monkeys because of the closer correlation of the cerebral vasculature of this species to Homo sapiens. As a result of this study, it was concluded that these vessels do not constrict on direct external stimulation of various kinds, nor does active contraction occur after systemic administration of various agents.

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Read at the 10th Clinical Meeting of the American Medical Association, Seattle, Nov. 29, 1956.

Methods and Results

Fifteen rhesus monkeys were anesthetized with pentobarbital in doses of 0.5 grain (0.032 Gm.) of the drug per kilogram of body weight. An opening was made in the skull, and the meninges were reflected or removed over the area to be studied. In two experiments, a Lucite window was screwed tightly in place over the exposed pial surface. With a special camera, photographs of the blood vessels were made; these were later projected on a screen and magnified about 500 times. This magnification permitted accurate measurements of the width of the vessels and of any significant changes in their caliber.

Photographs were made before and after each of the following procedures, with the camera kept in the same position throughout the experiment: (1) stroking the pial surface with an applicator (fig. 1); (2) application of hot and cold stimuli to the pial vessels (fig. 2); (3) local application of epinephrine; (4) administration of epinephrine and arterenol intravenously (fig. 3); (5) bleeding from the femoral artery; (6) blood transfusion; and (7) administration of hexamethonium (Bistrium) bromide (fig. 4). The purpose of the first three procedures was to observe the effect of direct stimulation of various kinds upon the caliber of the pial vessels. The last four procedures were designed to determine the effect of marked variations in systemic blood pressure.

It was noted that, when ice or heat was applied to the pial blood vessels, no change occurred in the diameter of the vessels (fig. 2). When the pial surface was stimulated by stroking (fig. 1) or when epinephrine was applied topically, the size of the blood vessels did not change. When the blood pressure was raised by the administration of epinephrine or ar-

terenol, the diameter of the blood vessels increased considerably (fig. 3). When hypotension was produced by bleeding the animal, the blood vessels decreased in size. However, if the animal was then given a transfusion, the blood vessels returned to their normal size. When the blood pressure was lowered by the administration of hexamethonium bromide (fig. 4), the diameter of the blood vessels was again decreased.

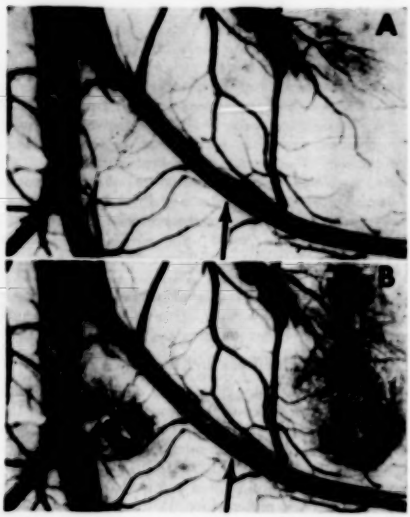

Fig. 1.—Photomicrographs of pial vessels in rhesus monkey. *A*, before stroking arterioles with applicator. *B*, after stroking arterioles with applicator. Note that the vessels remain the same caliber even though the stimulation has produced capillary hemorrhages.

Comment

The results of these experiments indicate that external stimulation of the pial vessels of the rhesus monkey does not produce changes in the diameter of these vessels. No difference in their caliber could be demonstrated after stroking the vessels or after the application of hot or cold stimuli. These findings strongly suggest that spasm of these vessels does not occur, at least not from external stimulation. It is conceivable, however, that if it were possible to stimulate these vessels in the same manner from within, different results might be observed.

Changes in the diameter of the pial arterioles were observed when significant changes in the systemic blood pressure were produced. When the blood pressure was reduced by administration of hexamethonium bromide or by bleeding, there occurred a corresponding reduction in the size of the pial vessels. When the blood pressure was raised by the administration of pressor agents or by transfusion, there was a corresponding increase in the caliber of the pial vessels. These changes thus appear to be entirely passive and dependent upon the level of the pressure within the vessels.

Of course, radiologists have claimed that they have demonstrated narrowing of the cerebral arteries with the injection of iodopyracet (Diodrast) compound into carotid arteries. Walker,[15] after viewing 800 cases of cerebral angiography, stated that he was not impressed that spasm of the intracranial arteries occurs and that he was unable to demonstrate spasm by using iodopyracet compound in the experimental animal. In cerebral angiography the results are influenced by the techniques, the rapidity of injection of the contrast medium, systemic blood pressure, and the phase of cardiac cycle. If the results are to be compared critically, all these factors must be uniform. It has been demonstrated that the extracranial carotid arteries may constrict; therefore, it is theoretically possible that the radiologic changes which occur on one side of the brain might be only a reflection of the spasm of the large extracranial arteries rather than of the pial arterioles.

The results of these experiments thus support the view that cerebral angiospasm does not occur, at least in the pial vessels. When variations in the caliber of these vessels were observed, they invariably followed changes in systemic blood pressure. This finding is in accord with the phenomenon of cerebral vascular insufficiency described by us and our co-workers [9] in 1953. Interest in this subject was aroused by the observation of sudden hemiplegia in a patient who had just suffered a severe gastric hemorrhage associated

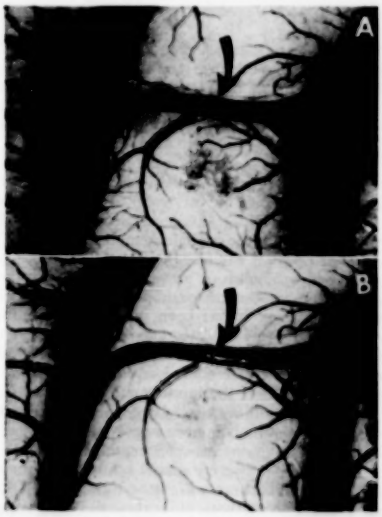

Fig. 2.—Photomicrographs of pial vessels in rhesus monkey. *A*, before application of ice to surface of brain. *B*, after application of ice to surface of brain. Note that the caliber of the arterioles does not change.

with a marked fall in blood pressure. As soon as the blood pressure was restored to normotensive levels, the hemiplegia disappeared.

This observation led to a series of experiments in the monkey designed to elucidate the mechanism of this phenomenon.[3] It was shown that transient electroencephalographic abnormalities occur when systemic hypotension is produced in animals whose carotid arteries were narrowed on one side by a graduated occlusive clamp. It was further demonstrated that the electroencephalographic changes could be reversed when the animal's blood pressure was restored to normal by transfusion or by the administration of vasodepressor drugs. It was shown that the electroencephalographic changes were due to the drop in blood pressure itself and not to anemia. Thus it appeared that a condition closely analogous to coronary insufficiency can occur with respect to the cerebral arterial system, and because the physiological phenomenon resembled that which occurs in the myocardium with narrowing of the coronary vessels, we termed the condition "cerebral vascular insufficiency."

Many observers have reported cases in which transient or permanent focal and generalized signs or symptoms occurred in the presence of occluded cerebral arteries.[4] However, this was the first time that it could be demonstrated experimentally that reversible ischemic signs could develop in the brain due to narrowing of the cerebral vessels without complete occlusion.[3] In these studies, the development of cerebral ischemia (infarction) would seem to result from inadequacy of the collateral circulation in the presence

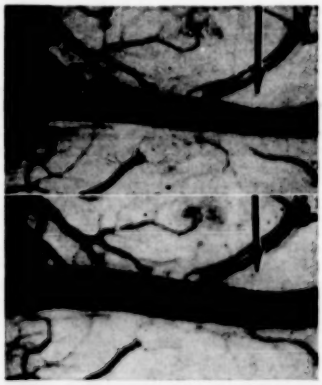

Fig. 3.—Photomicrographs of pial surface in rhesus monkey, demonstrating that the arterioles of the brain increase in caliber as the systemic blood pressure is raised by parenteral administration of epinephrine. *A*, before administration of epinephrine, blood pressure 96 mm. Hg. *B*, after administration of epinephrine, blood pressure 130 mm. Hg.

of hypotension. On the contrary, when the pressure was maintained at normotensive levels, the collateral blood flow was apparently capable of preventing the occurrence of significant ischemic changes in the region usually supplied by the narrowed artery.

The results of the experimental studies strongly suggest that localized narrowing as the result of arteriosclerosis or congenital defect would predispose the patient to focal neurological changes in such form as hemiplegia and hemianesthesia when a hypotensive state occurs or when there is a disturbance of systemic hemodynamics. The immediate factor responsible for these focal cerebral changes is a deficiency of systemic blood pressure required to sustain the capillary blood

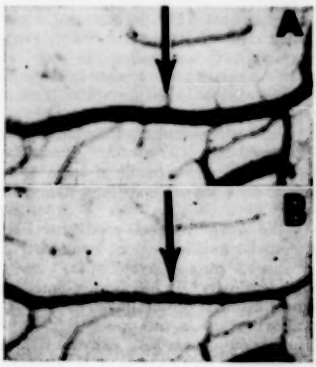

Fig. 4.—Photomicrographs of pial arterioles in rhesus monkey, demonstrating that arterioles decrease in size as systemic blood pressure is lowered by administration of hexamethonium (Bistrium) bromide. *A*, before administration of hexamethonium, blood pressure 132 mm. Hg. *B*, after administration of hexamethonium, blood pressure 54 mm. Hg.

flow necessary to permit adequate cerebral cell metabolism. When the blood pressure is normal, the capillary pressure distal to the narrowed or obstructed vessels is sufficient to supply the demands of cellular metabolism. The cells of the nervous system are particularly vulnerable to nutritional deprivation; their blood supply cannot long be withheld without the occurrence of severe and irreversible damage. It is well known that generalized cerebral effects can result from hypoxemia, hypoglycemia, and anemia per se without a hypotensive state being present. However, it should be emphasized that the localized changes of cerebral vascular insufficiency occur mainly as a result of hypotension, a diminished cardiac output, or a diversion of systemic blood flow to the extremities. These focal changes include convulsive seizures, focal paralysis, aphasia, astereognosis, unilateral blindness, homonymous hemianopsia, hemianesthesia, and hemiplegia. However, if the condition is of a more severe nature, general cerebral signs such as confusion, syncope, and coma may result.

The concept of cerebral vascular insufficiency would appear in many instances to offer a more satisfactory explanation for transient cerebral disturbances than has previously been advanced. This seems especially true in cases in which the same vessel is repeatedly involved. It is not likely that thrombosis or embolism with recanalization would recur several times in a single artery. Nor, in view of the experimental evi-

dence presented earlier in this paper, does it seem probable that cerebral vascular spasm is responsible for these phenomena.

Cerebral vascular insufficiency may be brought about by a number of different conditions. The causes are as follows: (1) hemorrhagic shock, (2) coronary shock, (3) anaphylactic shock, (4) insulin shock, (5) traumatic shock, (6) antihypertensive drugs, (7) postsympathetic disorders, (8) hypersensitive carotid sinus, (9) reflex vasodepressor phenomena, (10) postural hypotension, (11) gravitational states (aviation), (12) sleep (upright position), (13) surgical procedures, (14) anesthetics, (15) cardiac arrhythmias, (16) congestive heart failure, (17) pulmonary hypertension, (18) angiography, (19) thermal vasodilatation, (20) hypothermia, (21) Valsalva's maneuver, (22) pulmonary embolism, (23) labyrinthitis, and (24) sedative-hypnotic intoxication. It will be noted that the factor common to all of them is systemic hypotension, or a disturbance in systemic hemodynamics.

Among the more frequent conditions leading to cerebral vascular insufficiency are hemorrhagic shock, coronary shock,[5] cardiac arrhythmias,[6a] and carotid sinus hypersensitivity.[6] It has been pointed out that patients may manifest cerebral phenomena as the only presenting symptoms in the presence of acute myocardial infarction or cardiac arrhythmias. In such cases, the cardiac condition may be overlooked or thought unrelated to the symptoms of the nervous system unless one is aware of the possibility of cerebral vascular insufficiency resulting from cardiac disorders.

It is of great practical importance to recognize cases of cerebral insufficiency, since only prompt correction of the hypotensive state can prevent irreversible cerebral damage.

In view of the absence of vasoconstrictor innervation of musculature in the pial vessels, as demonstrated by Pickering,[1b] and the results of the experiments described in this paper, it appears unlikely that primary cerebral angiospasm can occur.

Conclusions

Experiments performed on the rhesus monkey suggest that cerebral angiospasm does not occur. Transient cerebral strokes are due to cerebral vascular insufficiency, thrombosis, embolism, or hemorrhage. Cerebral vascular insufficiency is due to either cerebral vascular narrowing or an occlusion in the presence of systemic hypotension. Prompt correction of the condition causing the hypotensive state in cerebral vascular insufficiency will prevent permanent cerebral damage.

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Atherosclerosis.—The evidence is fairly conclusive that the circulating lipoproteins are the source of the increased lipids found in atherosclerotic vascular walls. The physical state and particle size of the lipoproteins are important, probably due to the filtration properties of the vessel walls. Studies of numbers of mast cells in animals and humans, and of circulating heparin levels, indicate that decreased heparin production in the body may be etiologically important in the accumulation of large amounts of circulating low-density serum lipoproteins. An unfavorable chemical balance of androgen over estrogen often results in increased levels of beta lipoproteins, which appears to be the prerequisite to atherogenesis. Treatment of 12 patients with 0.02 mg. of ethinyl estradiol daily for seven weeks failed to produce consistent laboratory improvement. Factors such as hypertension, diabetes mellitus, nephrosis, myxedema, local factors in the vascular wall, race, and eating habits unfavorably influence atherosclerosis. — Col. H. C. Gibson, Etiologic Aspects of Atherosclerosis. *United States Armed Forces Medical Journal*, November, 1956.

POSTERIOR PERFORATING PEPTIC ULCER

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• *Analysis of 100 consecutive cases of posterior perforating peptic ulcer revealed that a patient with the presenting symptom of pain, particularly steady, continuous, and severe in the upper part of the abdomen or lower thoracic or back regions, often bizarre and not characteristic of ulcer pain, may well have a posterior penetrating peptic ulcer. The first indication of the presence of a peptic ulcer may be the symptoms caused by perforation. The location or even the presence or absence of pain due to a posterior perforating peptic ulcer is dependent upon the depth of perforation into the pancreas. When the diagnosis has been established clinically and intractability is apparent, surgical intervention should be undertaken as early as possible to relieve the patient of his severe pain and also to avoid more serious complications associated with the pancreas.*

This study was undertaken in view of frequent difficulties in diagnosis and management of posterior perforation as a complication of peptic ulcer, both gastric and duodenal. Symptoms of perforation may occur at any time during the history of peptic ulcer in an individual case. In fact, the first indication of the presence of a peptic ulcer may be the appearance of symptoms caused by perforation. Conditions governing whether or not perforation is to occur are not necessarily so conventional as commonly encountered in recurrent nonperforating peptic ulcer. Those ulcers that eventually perforate seem to involve a combination of "virulence" and intractability as well as constitutional or tissue susceptibility to perforation. The location or even the presence or absence of pain due to a posterior perforating peptic ulcer is dependent upon the depth of the perforation into the pancreas. The encroachment on adjacent viscera and somatic nerve fibers necessarily broadens and varies the extent of the pain experienced by the patient. In addition, marked variation also characterizes the appearance of the objective signs.

Objective Signs

The extreme degree of edema, induration, and adhesions to adjacent structures, often associated with such perforations into the pancreas, on roentgenologic examination often are indistinguishable from cancer of the stomach or pancreas. When bizarre pain in the abdomen, chest, and back is present, although other conditions may be given prior consideration, pancreatic penetration of posterior wall peptic ulcer should be considered in the differential diagnosis. The condition should also be suspected when pain from peptic ulcer becomes intractable under well-supervised and intensive treatment. This impression can be confirmed by roentgenographic demonstration of a sharply circumscribed accumulation of barium upon the posterior wall of the stomach or duodenum. Under these circumstances, a sign which is almost pathognomonic of pancreatic penetration is the demonstration of a broad zone of radiolucency ("halo" effect) about the pocketed barium upon the application of pressure at the site of the lesion. The usual stellate pattern of the mucosal folds visualized radiographically converging upon an ulcer crater is, in posterior perforations, lost at the zone of radiolucency about the crater (fig. 1). The breadth of this nonopaque zone is proportionate to the depth of the perforation and the associated inflammatory reaction. Frequently, air contrast mucosal studies, with the patient supine, add convincing evidence to this diagnosis.

A patient with the presenting symptom of pain, particularly steady, continuous, and severe pain in the upper part of the abdomen or lower thoracic or back regions, often bizarre and not particularly characteristic of ulcer pain, may well have a posterior penetrating peptic ulcer. At one extreme, some of these patients show little, if anything, on gastrointestinal x-ray study and thus have been branded psychoneurotics. At the other extreme, some of these patients show great deformity of either the stomach or the pancreas, strongly suggesting carcinoma of those organs; however, this may be difficult to differentiate even at the time of exploration.

From the Department of Surgery (Dr. Adams) and the Department of Gastroenterology (Dr. Ross), the Lahey Clinic.

Review of Cases

One hundred consecutive cases of posterior perforating peptic ulcers were analyzed. Of the 78 males and 22 females with the condition, 82 were between the ages of 30 and 60 years. The presenting symptom of pain was severe in 72 patients and was located in the epigastric and back regions in 91 and 23 respectively. Emesis was a symptom in 51 patients, and 9 had had a previous hemorrhage. Obstructive symptoms were present in 19.

The diagnoses were duodenal ulcer in 66 cases, with one at first thought to be carcinoma; gastric ulcer in 29, with 5 at first clinically designated carcinoma; and carcinoma simplex in one, which at first had been thought a case of gastric ulcer. There was no roentgenographic examination in the remaining four patients. There were five deaths, two due to peritonitis and one each to intestinal obstruction, pneumonia, and cerebral infarction after a fall that occurred postoperatively.

Complications and Their Prevention in Surgical Treatment

When the diagnosis has been established clinically and intractability is apparent, surgical intervention should be undertaken as early as possible to relieve

the patient of his severe pain and also to avoid more serious complications associated with the pancreas. The treatment of choice is subtotal gastrectomy, but the morbidity and mortality is higher in this group because of the higher incidence of serious complications primarily related to the duodenal stump or associated with the pancreas.

Fig. 1.—Roentgenogram of posterior penetrating ulcer, demonstrating the broad zone of radiolucency ("halo" effect) about the pocketed barium upon application of pressure at the site of the lesion.

Since in this group of complicated ulcers the chief hazards associated with resection are those relative to the pancreas and the duodenal stump, it is most apparent that one must carefully consider the basic causes for such complications and what measures can be taken to avoid them. It is generally agreed by all surgeons that one should have the greatest respect for the pancreas as a potential source of serious complications when any type of surgery is being done in close anatomic relation to that important organ. Any trauma, even minor, incision into, or even break in the capsule may result in either a severe pancreatic reaction or a pouring out of secretions into the surrounding tissues, with an associated potent enzymatic reaction and necrosis, delayed healing, and marked inflammatory reaction in the adjacent tissues. Chemical necrosis and abscess and superimposed pyogenic infection on the resultant necrotic tissue lead to further complications. Clinically, these complications are chiefly acute pancreatitis, subhepatic or subdiaphragmatic abscess on either side, biliary obstruction, pancreatic fistula, necrosis and breakdown of the duodenal stump with fistula, obstruction or leakage of the gastrojejunal anastomosis, or obstruction of either the efferent or afferent loop. These complications may be single or multiple, and all will produce serious morbidity and mortality.

Our experience has led us to believe that the majority of these complications can be prevented by certain technical precautions during resections of the adherent ulcers penetrating into the pancreas. At the time this portion of the stomach or duodenum is mobilized from the pancreas, meticulous care should be taken to avoid damaging or opening up pancreatic tissue. This can be accomplished only by careful dissection, under direct vision, of the surrounding adherent wall, with mosquito forceps and meticulous hemostasis being utilized. When the actual bed of the ulcer is reached, no attempt should be made to dissect deep to it. In the posterior perforated ulcer, the stomach or duodenal wall is no longer present and the base of the ulcer is represented by a granulating, sealed-off surface of the pancreas. The margin of this ulcer should be carefully detached from the pancreas, with the granulated ulcer bed being left on the pancreatic surface undisturbed (fig. 2).

The duodenal or stomach wall distal to the ulcer should then be carefully dissected from the pancreas until sufficient good pliable wall is developed to permit satisfactory closure of the stump. This procedure

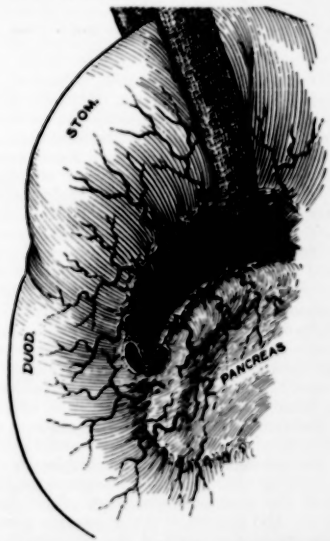

Fig. 2.—Margin of ulcer is carefully detached from pancreas, leaving granulated ulcer bed on pancreatic surface undisturbed.

should preferably be a three-layer closure: a mucosal layer made by inverting continuous absorbable surgical sutures; a serosal-muscular layer made by continuous, inverting, Lembert, absorbable surgical sutures; and finally a serosal-muscular layer of interrupted Lembert sutures of silk. Turning in large

amounts of wall with each of these layers should be avoided. The completed suture line should not be buried in the pancreas, but the stump and the surrounding pancreatic surface should be covered with adjacent mesentery with interrupted sutures.

The stomach is then mobilized on both mesenteric borders, with the left gastric artery and the short gastric arteries ligated so that approximately two-thirds to three-fourths of the stomach may be resected. If a high resection is done, the anatomy in most patients is such that it is difficult to apply a von Petz clamp satisfactorily at this level. If such a clamp cannot be used satisfactorily and in order to obtain the satisfactory hemostasis that is absolutely essential for excellent function of the gastrojejunal stoma, the following technical method has been developed. The serosal and muscularis layers of the stomach are carefully incised transversely across the stomach, both front and back, at the approximate level of resection, with exposure of the large vessels as they lie in the submucosal layer. These well-visualized vessels are then ligated in continuity individually with fine silk sutures (fig. 3); this will control effectively the major portion of the bleeding from the transected stomach edges when this final layer is divided. This avoids the difficulty of securing these vessels, which retract under the mucosa if all layers of the stomach are simply cut across.

Since British investigators [1] have shown conclusively that there are arteriovenous communications in the vascular bed of the stomach wall, it is obvious why these blood vessels in the gastric wall have such high pressure and bleed so profusely and why the stomach will survive when such a great part of its major blood supply is shut off during various types of surgical

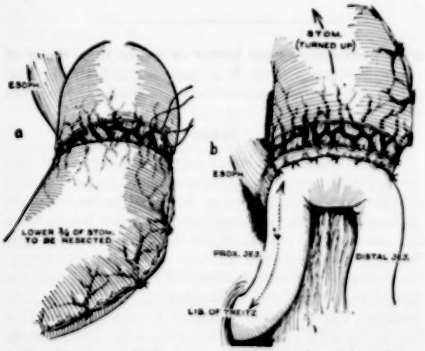

Fig. 3.—A, serosal-muscularis layers incised, exposing large vessels in submucosal layer. *B*, ligation of large vessels in continuity individually.

procedures. If any of these vessels with high pressure are not meticulously ligated in that portion of the stomach wall used for the anastomosis, there will be varying degrees of submucosal hemorrhage and hematoma surrounding the stoma; this will account for the delay in emptying the gastric stump, which delay may last for days to weeks after the operation. This will necessitate prolonged tube drainage until the hematoma has been absorbed. In some cases, it is possible even to demonstrate this process by visualizing with barium a smooth doughnut-like ring around the stoma. In many cases, this postoperative delay in emptying of the gastric stump can be avoided by meticulous hemostasis, with the method described being used.

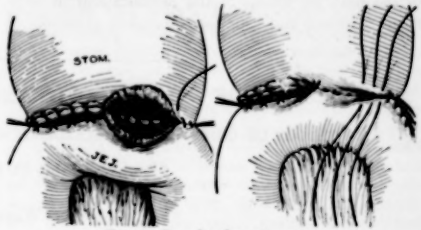

Fig. 4.—Completed anastomosis.

Another important technical point to be discussed is the desirability or the undesirability of twisting the jejunal loop in making the union with the stomach; in other words, whether the loop is placed isoperistaltically or antiperistaltically. In addition, these latter designations are confusing, and the following terminology specifies more clearly: distal end of the jejunal loop to the lesser or greater curvature or, vice versa, proximal end of the jejunal loop to the lesser or greater curvature. As far as function per se goes, placing the loop in either direction is entirely satisfactory. We prefer not to twist the loop and to place the distal end of the jejunal loop to the greater curvature, because it accomplishes two things which placing the loop in the other direction does not (fig. 3*b*).

First, it places the afferent functioning arm of the jejunal loop over in the left lateral gutter, far away from the dangerous area of the duodenal stump and uncovered pancreas, so that, if complications do occur in that area, this jejunal loop will not become involved, thus obstructing the stomach. Everyone is aware that most patients will survive properly handled duodenal and pancreatic fistulas provided the stomach is not obstructed and proper nutrition can be maintained. Patients in whom the afferent jejunal loop is obstructed will almost invariably be those in whom the loop is twisted with this afferent arm lying near or across the acute inflammatory reaction associated with duodenal stump or pancreatic complications. A feeding jejunostomy must then be resorted to, and usually this is unsatisfactory because of the length of time essential for recovering from these serious complications. Second, by not twisting the loop a shorter loop can be utilized, establishing the anastomosis closer to the ligament of Treitz, since in the antecolic anastomosis the loop slides more laterally over the splenic flexure and does not have to ride over the more bulky transverse colon. Another point of importance is to suture the jejunal loop across the entire diameter of the stomach, buttressing it over the closed portion of the stomach as well, in the Hofmeister modification, so that the jejunal loop does not hang by the stoma and has a broad attachment to the stomach in both planes (fig. 4).

Comment

We are fully aware that many of these technical details are of a controversial nature and that there are other excellent methods of obtaining equally good results. These are factors of great importance, however, and should be stressed more than they have been in the past. By means of the modifications in technique discussed and, especially, complete avoidance of even minor pancreatic injury and special technical measures to provide meticulous hemostasis at the site of the anastomosis, a high percentage of complications and poor function can be prevented.

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SURVEY OF GASTROSCOPIC AND ESOPHAGOSCOPIC ACCIDENTS

REPORT OF COMMITTEE ON ACCIDENTS OF THE AMERICAN GASTROSCOPIC SOCIETY

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• *Over 890 endoscopists were asked to report accidents peculiar to their practice. A report was compiled dealing with such accidents as encountered during a total of 267,175 gastroscopies and 40,540 esophagoscopies. The purpose of this survey was to determine the calculated risks of these procedures and to accumulate information on the circumstances which apparently contribute significant hazards to transoral instrumentation. Perforation was the main problem, but anesthetic reaction was not an inconsiderable threat. The over-all accident rate in cases of gastroscopy was 0.079%, and in cases of esophagoscopy, 0.25%. The findings are interpreted in an effort to find ways to circumvent accidental endoscopic injury.*

As one of its avowed responsibilities, the American Gastroscopic Society initiated, in 1955, a world-wide survey of experiences with gastroscopic and esophagoscopic accidents. The purposes were to determine the calculated risks of the procedures, as indicated by the combined experiences of many endoscopists, and to accumulate information on the circumstances which apparently contribute significant hazards to transoral instrumentation. Interpretation of the findings reported here, in efforts to find ways to circumvent accidental endoscopic injury in the future, is believed to be the privilege and responsibility of those who take an interest in the results.

The data which make up this report must be evaluated cautiously. There are two main potential sources of misinterpretation. A questionnaire survey asks the participant for specific information, but often the circumstances surrounding an endoscopic accident are such that specific answers cannot be furnished with unquestioned accuracy. For instance, the answer to the question of whether an esophageal perforation was recognized immediately or only after a delay sometimes must be based on very vague retrospective feelings about the course of events immediately following instrumentation. Similarly, if the patient survives a perforation without surgical exploration, it may be very difficult to specify with any assurance the actual site of the perforation; nevertheless, the answer must necessarily appear on the question sheet as a seemingly precise bit of information.

Secondly, many of the data are of such a nature that it is easy to assume that they can be compared with each other. In the absence of information on the conditions which exist during endoscopy which is not attended by accidents, however, certain comparisons must not be attempted. Thus, most gastroscopic perforations were made with an instrument of a certain design, but this is merely a reflection of the fact that most gastroscopists regularly employ instruments of this design, not that there is necessarily any inherent danger in it. The same is true for the anesthetic agents which caused most reactions. Similarly, individual accidents of the same general nature assume various degrees of severity, and many factors have a bearing on the outcome. If the results of surgical intervention after perforation seem better or worse than those of medical management, it is just as likely to be the seriousness of the injury as the type of treatment which made the difference.

Scope

A questionnaire on gastroscopic accidents and one on esophagoscopic accidents were sent to each of 890 doctors who were known or believed to be active in endoscopic work. The mailing lists were taken from the membership rosters of the American Gastroscopic Society, the American College of Gastroenterology, the American Gastroenterological Association, and the American Broncho-Esophagological Association. In addition, Dr. F. Avery Jones of London furnished a list of the 40 British gastroscopists who had contributed to his accident survey of 1951,[1] and 40 other personal acquaintances in foreign countries were contacted.

Replies were received from about one-third of the doctors who were invited to participate. It was found that 204 gastroscopy and 119 esophagoscopy questionnaires from a total of 260 participants were suitable for use in the compilations. The main reason for rejection of reports was unavailability of figures to show the total number of procedures carried out. In particular, many of the more experienced esophagoscopists found that it was not possible to compile

figures to cover their total series. This report deals with the accidents encountered during a total of 267,175 gastroscopies and 40,540 esophagoscopies. The geographical origins of the reports which were utilized were as follows: continental United States, 224; Hawaii, 1; Puerto Rico, 1; Canada, 2; Mexico, 2; Cuba, 1; Chile, 1; Argentina, 1; Venezuela, 1; England, 9; Australia, 2; Sweden, 1; Denmark, 1; Germany, 3; Switzerland, 3; Belgium, 1; Holland, 1; Spain, 1; Hungary, 1; Austria, 1; and India, 1.

The report of each gastroscopist included his whole experience with the flexible gastroscope; therefore, although experience with the rigid gastroscope was not included, the reports of the older gastroscopists went back to the earliest days of modern gastroscopy,

TABLE 1.—*General Experiences of Endoscopists*

	Gastroscopists	No. of Gastroscopies Performed	Esophagoscopists	No. of Esophagoscopies Performed
Totals	294	267,175	119	40,540
No accidents	109	72,544	75	11,631
Perforations	81	172,044	42	26,659
No accidents except from anesthetic	10	13,555	2	2,250
No accidents except postexamination bleeding and/or myocardial infarction	4	9,032		
Total no. who had experienced anesthetic accident	20		5	
Total no. who had experienced postexamination bleeding and/or myocardial infarction	9			

1932, when means of treating accidental injury were not as effective as they now are. It can be seen from the figures above that about half of the reporting esophagoscopists also reported upon gastroscopy. Because the trend to expand the mission of the gastroscopy clinic to encompass medical esophagoscopy is a rather recent one, most of these participants reported on many more gastroscopies than esophagoscopies. Thus, many of those who have been practicing diagnostic, as opposed to manipulative, esophagoscopy were relatively inexperienced at esophagoscopy, although not at peroral endoscopy. Most of the other esophagoscopists, it is important to note, reported on experiences which included a large proportion of manipulative cases, particularly foreign-body problems and transesophagoscopic dilatations. Although transoral manipulative techniques other than endoscopy were not included in the survey, there were, nevertheless, transesophagoscopic manipulations in many of the cases here reported.

General Experiences of Participants

In table 1 are set forth the general experiences of the participating endoscopists. Although the majority of gastroscopists and esophagoscopists had never encountered an accident, it is seen that these were the endoscopists who had had the smallest average experience. It could not be concluded that the participants had exhibited more care in instrumentation when novices than after attaining the stage of extensive experience.[2] Rather, it appeared that the simple law of remote chance eventually exerted its influence after an endoscopist had carried out enough examinations. Other factors which were evident in the reports were that some of the experts had exposed their patients to unusual risks by experimenting with new instruments and new techniques and that others frequently accepted for examination poor-risk patients whom, as novices, they would have rejected.

Accident Incidence

The over-all accident rate in cases of gastroscopy was 0.079% and in cases of esophagoscopy, 0.25%. The over-all fatality rate for patients undergoing gastroscopy was 0.014% and for those undergoing esophagoscopy, 0.059%. The types and incidences of the reported accidents are summarized in table 2. Perforation was, of course, the main problem, but anesthetic reaction was not an inconsiderable threat. The other accidents (postexamination bleeding and/or myocardial infarction), which were encountered only in gastroscopic experience, were those which could not be ascribed with assurance to the procedure but which, nevertheless, must be considered gastroscopic accidents because of their chronology. Six patients had bleeding from the upper gastrointestinal tract within 24 hours after gastroscopy. In each patient the bleeding stopped spontaneously. The exact source was determined in none, and in none was the bleeding of serious import. Five other patients suffered acute myocardial infarction and died. The onset of symptoms occurred in one patient on the way to the gastroscopy room, during preparation of one patient, during examination of two patients, and one-half hour after gastroscopy was performed in one patient. In two cases instrumentation was not carried out.

Perforations During Gastroscopy

The 163 perforations experienced during gastroscopy resulted in 25 deaths. Eighty-three perforations occurred in women and 76 in men (4 not stated), and 17 deaths occurred among women as compared with 8 among men. The number of deaths per age decade from the third through the seventh decades were, respectively, 2, 1, 7, 10, and 5.

TABLE 2.—*Summary of Accidents*

	Gastroscopy			Esophagoscopy		
	Accidents	Deaths	Autopsies	Accidents	Deaths	Autopsies
Perforations	163	25	22	95	22	10
Anesthetic	36	8	6	6	2	2
Postexamination bleeding and/or myocardial infarction	11	5	3			

The general design (not manufacturer) of instrument and type of gastroscopic tip which had been employed in the instances of perforation are shown in table 3. Because it is not known relatively how frequently the various types of instrument are used by gastroscopists, the incidence figures give no information regarding the relative safety of the various designs. The instrumentation was considered by the endoscopist to have been easy in 117 cases of perforation and difficult in 38 (not stated in 8). The figures for the fatal cases were 20, 4, and 1. The accident was recognized within 30 minutes of passage of the instrument in 81 instances and only after a delay (more than one-half hour to two days) in 78 instances (not stated in 4). Among patients who eventually died as a result, recognition of perforation was immediate in 16 and delayed in 9 instances.

The stomach was the most common site of perforation (table 4), and, surprisingly, a perforation in this site proved to be a moderately dangerous accident. Perforation of the distal portion of the esophagus was, as expected, the most dangerous type. Centimeter for centimeter, the region of the hypopharynx and

TABLE 3.—*Type of Equipment Used in Performing Gastroscopy in Instances When Perforations Occurred*

	No.	Deaths
General design of instrument		
Wolf-Schindler	96	15
Hermon Taylor	46	9
Benedict	7	0
Transesophagoscopic	2	0
Schneider-Cogswell	1	0
Gastroflex	1	0
Not stated	10	1
Type of tip		
Rubber finger	138	22
Bullet	6	1
Sponge	1	1
Ball	1	0
Not stated	17	1

adjacent proximal esophagus proved most vulnerable to perforation, although the results of treatment were especially good. In two instances the jejunum was perforated during examination of the stomach postoperatively, and in another the gastroscope was passed by error into the trachea, with perforation of the right bronchus.

Eighty-four of the 163 cases of perforation were managed by surgical drainage, 68 by medical treatment alone, and in 11 instances the form of therapy was not stated. The site of perforation had very little bearing on the decision regarding operative intervention. In about half the patients with each type of perforation surgical drainage was used. There were 16 deaths among the surgically managed patients and 8 among those treated medically only (one not stated).

The apparent explanations for each of the perforations, as judged by the examiner from clinical, surgical, and/or autopsy study, are outlined in table 5. The direct causes of death among the 25 perforation fatali-

TABLE 4.—*Sites of Perforations Occurring During Gastroscopy*

	No.	Deaths
Pharynx	19	1
Upper ⅓ esophagus	36	3
Middle ⅓ esophagus	3	0
Lower ⅓ esophagus	26	9
Stomach	75	12
Jejunum	2	0
Bronchus	1	0
Not stated	1	0

ties are shown in table 6. Although mediastinitis was the most frequent cause, peritonitis and the late sequels of peritonitis were common. Some, but not all, of the deaths due to infection occurred during the early days of gastroscopy, prior to development of efficient antibacterial drugs.

Perforations During Esophagoscopy

Ninety-five perforations resulting in 22 deaths were reported during esophagoscopy. Fifty men and 45 women were injured, and the fatalities occurred in 13 men and 9 women. The number of deaths per age decade from the first through the ninth were, respectively, 2, 0, 3, 0, 2, 8, 4, 1, and 1 (not stated in one case). The examinations which resulted in perforation were considered by the examiner to have been easy in 35 cases and difficult in 49. Eight of the former group and 9 of the latter died. The information was not given for the other examinations. Perforation was recognized immediately in 41 instances and not until more than one-half hour had elapsed in 54. Among the fatal cases, recognition of perforation was immediate in 9 and delayed in 12 (not stated in one).

The majority of perforations occurred through the hypopharynx and upper part of the esophagus (table

TABLE 5.—*Inciting Lesions for Perforations Occurring During Gastroscopy*

	No.
Perforation through carcinoma or ulcer	12
Blowout of carcinoma or ulcer	2
Spinal osteophytes	2
Pernicious anemia: ? weakened gastric wall	2
Carcinoma obstructing cardia	2
Passage of instrument through gastroenteric stoma into jejunum	2
Esophageal diverticulum	1
Leukemia: ? weakened tissues	1
Hourglass stomach	1
Gastric adhesions	1
Passage of instrument into trachea	1
No inciting lesion or other explanation recognized	136

7). Proportionately, the more distal perforations proved considerably more dangerous. In many instances the esophageal disease which led to the esophagoscopy appeared to be the direct explanation for the perforation. The incitant proved to be a foreign body in 16 cases, carcinoma in 15, corrosive (lye) esophagitis in 11, stricture in 9, diverticulum in 4, atresia in 2, achalasia in 1, and nonspecific esophagitis in 1. There was no evident incitant in 36 cases. It is important to note in this connection that in the foreign-body

TABLE 6.—*Cause of Death in Patients with Perforation Occurring During Gastroscopy*

	No.
Death during first few days	
Mediastinitis	10
Peritonitis	7
Tension pneumothorax	1
Simple pneumoperitoneum: ? cause	1
Death during surgery for repair	
Death during anesthesia	1
Cardiac standstill	1
Death during convalescence	
Pulmonary embolus	1
Pneumonia	1
Subphrenic abscess	1
Chronic hepatic and pulmonary abscesses	1

cases it was often not possible for the esophagoscopist to distinguish perforation due to the foreign body itself from that due to subsequent transesophagoscopic manipulation and that, whichever the case, these were accidents due to operative, not diagnostic, esophagoscopy. The situation was rather similar in the stricture cases because, in some, the examiner had used the esophagoscope for dilatation purposes.

A biopsy had been taken in 18 of the cases of perforation. In one instance it was proved that the biopsy had caused the perforation. Surprisingly enough, more esophagoscopic perforations were treated by medical means alone (54) than by surgical drainage (37). The method was not stated for 4 cases. There were 15 deaths among patients treated medically and only 3 among those operated on. The method of treatment was not stated for 4 of the fatal cases. The causes of death of the 22 patients with esophagoscopic perfora-

tion were mediastinitis in 16 cases, empyema in 2, purulent pericarditis in 1, pulmonary embolus in 1, and pseudomembranous enterocolitis in 1. The cause was unexplained in 1 case.

Accidents Related to Use of Anesthetics

Because of the similarity of techniques and agents employed, experience with anesthetic accidents during gastroscopy and esophagoscopy have been combined (table 8). There were, then, a total of 307,715 cases reported on, and it is assumed that some form of anesthesia was used for every patient. This assumption is not absolutely correct, but it is known from the reports and from personal inquiry among the participating group that all of the endoscopists almost always give the patient some pharmaceutical preparation—here loosely termed anesthetic—prior to instrumentation. In almost all cases of reaction more than one drug was used for preparation, but, because the different ones are ordinarily used at different intervals prior to instrumentation and because reaction to those used for local anesthesia appears quickly after administration, the participants in all cases were willing to specify which drug was at fault when reaction occurred.

Thirty-eight of the 42 accidents were due to a local anesthetic agent, and 10 of the patients died. The four reactions ascribed to other drugs used for preexamination preparation were of little consequence. Information was not obtained on the technique used for inducing anesthesia (swab, spray, or gargle) or on whether epinephrine was routinely added to the anesthetic solution. In 18 instances a barbiturate had been used for premedication, in 10 it had not, and for 10 the information was not stated. The main clinical manifestations during the reactions were convulsions, cardiac arrest, cyanosis, sudden shock, and coma. When death occurred, it did so within a few minutes. Treatment in almost all cases consisted of intravenous administration of oxygen and a barbiturate, with or without artificial respiration. In two instances the chest was immediately opened for manual cardiac massage, and there was one survival.

TABLE 7.—*Perforations: Sites of Perforations Occurring During Esophagoscopy*

	No.	Deaths
Pharynx	25	1
Upper ⅓ esophagus	31	6
Middle ⅓ esophagus	14	7
Lower ⅓ esophagus	22	8

TABLE 8.—*Accidents Related to Use of Anesthetics* During Gastroscopy and Esophagoscopy*

	Total	Deaths
No. of accidents	42	10
Responsible agent:		
Tetracaine (Pontocaine) hydrochloride, 2%	25	5
Tetracaine, 1%	8	4
Tetracaine, ½%	2	0
Cocaine, 10%	3	1
Alkaloids of opium (Pantopon), 20 mg.	1	0
Morphine, 15 mg.	1	0
General inhalation anesthesia	1	0
Thiopental (Pentothal) sodium	1	0

* Data taken from reports on 307,715 cases in which anesthetic was used.

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OUTBREAK OF ASEPTIC MENINGITIS CAUSED BY COXSACKIE B5 VIRUS

LABORATORY, CLINICAL, AND EPIDEMIOLOGIC STUDY

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** Human and primate cells in culture were used to establish viral etiology for aseptic illnesses involving the central nervous system not proved to be poliomyelitis. This program of laboratory studies resulted in recognition and etiological specification of epidemic aseptic meningitis occurring in Minnesota in the summer and autumn of 1956. Tissue culture methods permitted characterization of the epidemic as an outbreak of Coxsackie virus infection restricted, as had not previously been observed, to a single immunotype. This finding provides further evidence that viruses other than the three known types of poliovirus may cause clinical illness designated as nonparalytic poliomyelitis until the causative agent is recovered and identified.*

Etiological distinction of human illnesses previously grouped by clinical diagnosis as nonparalytic poliomyelitis and/or aseptic meningitis recently became possible by use of tissue culture methods now widely applied to virus investigations.[1] Each year since 1948, studies in this laboratory incidental to identification of more than 1,000 wild strains of poliovirus have yielded viruses of the Coxsackie B subgroup from patients hospitalized during the poliomyelitis season with symptoms clinically diagnosed as "nonparalytic poliomyelitis." Most of these diseases could be classified as aseptic meningitis. In addition, from 20 to 40% of patients hospitalized with a clinical diagnosis of poliomyelitis [2] annually failed to yield poliovirus. It seemed reasonable that directed study of these findings, seemingly connected only by the classification of "nontypical polio," might lead to recognition of one

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or more specific infections. Accordingly, in 1956 a program was initiated to establish viral etiology for each aseptic illness involving the central nervous system not proved to be poliomyelitis, by use of a variety of human cell strains in continuous culture together with primary monkey kidney cell cultures. The occurrence of epidemic aseptic meningitis in Minnesota in the summer and autumn of 1956 and the hitherto unobserved restriction of the cause of an outbreak of Coxsackie virus infection to an agency of a single immunotype provided unique opportunity for

TABLE 1.—*Serologic Response of Patients to Prototypical and Homologous Strains of Coxsackie B5 Virus*

Patient	Days After Onset	Serum Titers Against 300 to 1,000 TCD_{50} of Virus: Prototype Virus	Homologous Virus
6	0	20	20
	7	50	50
31	1	20	100
	12	250	250+
34	1	20	20
	11	100	100
55	2	10	20
	12	50	100
56	2	50	100
	12	250	250+
61	3	0	0
	10	100	50

etiological specification of a variety of the aseptic meningitis syndrome. This paper reports the laboratory, clinical, and epidemiologic findings for patients from whom virus was recovered.

Laboratory Methods

The program of laboratory studies was implemented on reception of materials following the 1956 poliomyelitis epidemic.

Specimens.—Specimens for laboratory examination were obtained immediately upon admission to hospital of each patient with a diagnosis of nonparalytic poliomyelitis as follows: (*a*) fecal samples were collected in paper cartons on two consecutive days, (*b*) swabs of oropharyngeal and tonsillar areas of the throat were taken, and (*c*) samples of cerebrospinal fluid and blood were obtained aseptically. Venous blood was drawn on admission and approximately 10 days later to provide acute and convalescent phase samples for antibody assay. From 1 to 11 days had elapsed between onset of clinical illness and collection of specimens.

Examinations for Virus.—Examinations for virus were done on each specimen by use of HeLa stationary cultures as previously described.[1a] Fecal extracts representative of 19 patients also were inoculated in triplicate into stationary tube cultures of (*a*) monkey kidney cells dispersed from tissue with trypsin [1b] and (*b*) human esophageal and liver cells of established and clonal strains respectively.

Identification of Unknown Cytopathogenic Viruses.—Identification of unknown cytopathogenic viruses was necessary in 62 instances; 47 of 109 cytopathogenic agents isolated from materials submitted during the 1956 season were identified as polioviruses. Cerebrospinal fluid was obtained from 13 of the 62 patients whose fecal samples gave evidence of nonpoliomyelitic infection, throat swabs were provided by 28, and paired serum samples by 46. Each of the 62 unknown virus strains was examined by incubation of 30 to 300 tissue-culture doses (TCD_{50}) with pooled monkey antiserum for one hour at room temperature, followed by inoculation of 1-ml. aliquots of serum-virus mixture into four tube cultures of HeLa cells; assays also were done with human esophageal or liver cells and monkey kidney cells as indicated. The pooled monkey antiserum contained 20 antibody units to each of Coxsackie virus immunotypes B1, B3, B4, and B5 and 6 antibody units to B2 virus. Cultures were inspected under the microscope daily for four days to detect cytopathogenic effect. Antibody titers were calculated by Reed-Muench interpolation.[2]

Antibody Assays.—Antibody assays were performed on patients' serums diluted 1:10 in cell-culture maintenance medium, heated at 56 C for 30 minutes, then finally diluted 1:50 and 1:250. Test virus titers were determined on each day of test. The two final dilutions of paired serums from 42 patients were tested with 100 TCD_{50}, respectively, of types 1-3 polioviruses and Coxsackie B5 virus. Serum pairs from 32 of the patients were retested similarly with both 300 and 1,000 TCD_{50} of stock Coxsackie B5 (prototypical Faulkner strain) virus and/or virus isolated from the patient and with 100 TCD_{50} of Coxsackie B3 virus. Serum dilutions were mixed with test virus in equal volume and incubated for one hour at room temperature. One-milliliter aliquots of each test mixture were transferred to four HeLa, human esophageal, human liver, or monkey kidney cell cultures washed free from medium. Results were determined as in the virus identification test.

Results

Virus Isolations.—In the Minnesota outbreak of aseptic meningitis, Coxsackie virus strains were isolated from 62 patients who became ill between July

TABLE 2.—*Serologic Relationship of Six Minnesota Strains of Coxsackie B5 Virus to Prototype Strain*

Virus from Patient No.	Days After Onset	Antibody Titers of Serum From: Homologous Patient	Patient 61	Control Monkey*
6	0	20	0	1,000
	7	100	20	
31	1	100	...	5,000
	12	250+		
34	1	20	...	1,000
	11	100		
55	2	20	0	5,000
	12	100	100	
56	2	100	...	5,000
	12	250+		
61	3	0	0	5,000
	10	50	50	
Prototype virus			0	5,000
			100	

* Hyperimmunized with prototype Coxsackie B5, Faulkner strain; prototype virus with hyperimmunized hamster serum received from Dr. Dalldorf, of the New York State Department of Health, yielded an antibody titer of 5,000.

and December, 1956. Two or more stool specimens were obtained from 45 of 61 patients excreting Coxsackie B5 virus: 37 patients exhibited virus in each of 2 specimens, while each of five patients gave one negative specimen. Of three stool specimens from one patient, only the later two contained virus; one patient gave four specimens all containing virus, while another submitted four samples of which only the first contained virus. Coxsackie B5 virus was isolated from stools collected as early as one and as late as 13 days after onset of illness. B5 virus was found in throat washings from 15 of 28 patients from whom specimens

were obtained from 1 to 12 days after onset but was not isolated from cerebrospinal fluid. Wild B5 strains isolated in HeLa cell cultures from 36 patients uniformly produced acute encephalitis and death 5 to 14 days after intracerebral injection into two or three litters of newborn mice. Only one patient suffering aseptic meningitis during the 1956 season excreted virus other than Coxsackie B5: strain B3 Coxsackie virus was obtained from feces and throat washings.

It was interesting to note uniform sensitivity of the HeLa, esophagus epithelial, liver epithelial, and monkey renal cells employed in comparative tests as indicators for field strains of Coxsackie B5 virus in stools of 19 patients. In one instance the range of TCD_{50} titers exhibited by the different cells for each virus strain exceeded the range of error typical of titrations done in this laboratory (0.3 log), but only by 0.1 log. All of the cells thus were equally useful. B5 virus infection in cells of the four types was reflected by cellular rounding, cytoplasmic granularity and shrinkage, nuclear pyknosis, and, finally, cell rupture and release of fragments from glass, similar to cytopathogenic effects of poliovirus infection in these cells.

Neutralizing Antibody Assays.—Tests for neutralization of prototypical Faulkner B5 virus by paired serums from 33 patients indicated fivefold or greater titer increases for 9 patients. Four of these patients had no antibody in the first serum sample. Antibody in the early serum sample from 12 patients was not followed by significantly increased titer of the second sample. On test against 1,000 TCD_{50} of B3 virus, paired serums from the patient yielding Coxsackie B3 virus exhibited titer increase from 10 to 50; antibody to B5 virus was absent from both early and late specimens. Antibody to B5 virus was detected in serums obtained as early as the first day of illness from one patient or the second day from four patients. Two patients lacked detectable serum antibody as late as 5 days from onset, although it was present 10 days later. Ancillary tests showed for six patients (*a*) relative similarity of patient's serum titers for prototype B5 virus and patient's virus (table 1) and (*b*) failure of acute and convalescent-phase serums from patient 61 to distinguish prototype B5 virus from patients' viruses by comparison with control monkey antiserum to prototype virus (table 2).

Epidemiologic and Clinical Findings.—During 1956, Minnesota physicians reported 179 illnesses categorized as "epidemic poliomyelitis" to the state board of health. Sixty-six patients had one or more limbs paralyzed: 42 patients with paralytic and 5 with nonparalytic disease yielded viruses classified as 39 strains

TABLE 3.—*Virus in Throat Washings and Serum Antibody Levels in Sixty-one Patients Who Excreted Coxsackie B5 Virus*

Patient No.	Age, Yr.	Sex	Coxsackie B5: Days After Onset	Coxsackie B5: Virus in Throat Washing	Coxsackie B5: Antibody Titer	Poliomyelitis Antibody Titers: Type 1	Type 2	Type 3	Poliovaccine Doses Received
1	6	M	9		100	1,024	0	0	0
			110		100	1,024	0	0	
2	9	M							0
3	5	M							2
4	15	F	7		100	0	64	0	2
			22		250	0	64	0	
5	8	F	7		100	0	0	0	2
			25		100	0	0	0	
6	11	M	6		50	4	256	256	2
			7		50	4	256	256	
7	7	M	1		50	0	0	256	0
			15		50	0	0	64	
8	6	M							0
9	17	F	8	0	100	256	64	256	2
			18		100	256	64	256	
10	7	M	1	+	250	0	64	0	2
			11		250	0	64	0	
11	24	F	6	+		0	256	0	0
			15		50	4	256	0	
			34		50				
12	6	F	4		250+	16	1,024	0	2
			14		250+	16	1,024	0	
13	5	M	19		100	0	64	0	2
			36		100	0	64	0	
14	12	F	5	0		0	0	64	0
			13			0	0	64	
15	6	M	11	0		0	0	0	0
			21			0	0	0	
16	7	F	6		50				1
			102		250				
17	8	F	9	+	100	256	1,024	1,024	2
			19		100	64	1,024	256	
18	26	F	9			16	4	16	0
			28			16	4	16	
19	16	F							0
20	28	F		0					0
21	6	F	8		50	0	0	0	0
			43		50	0	0	0	
22	25	M	3		50				0
			17		100				
23	27	F	12	0		64	64	16	0
			22			64	64	16	
24	5	F	7		100	1,024	256	1,024	3
			22		100	1,024	256	1,024	
25	5	M	8			0	0	0	2
			41			0	0	0	
26	3	M	4						2
			42						
27	6	F	4	0		16	0	0	0
			14			64	0	4	
28	5	M	6	+	50	0	4	0	2
			16		50	0	4	0	
29	4	F							2
30	16	F	5	0		64	64	0	0
			15			64	64	0	
31	26	F	1	0	50	16	64	64	0
			12		250	4	64	64	
32	1	M							0
33	5	M	10	0	100	4	64	4	2
			20		100	4	64	4	
34	6	M	1	+	50	256	0	0	0
			11		100	256	0	0	
35	45	M		+					0
36	16	M							0
37	8	F	6	0		64	4,096	64	1
			16			64	1,024	64	
38	30	M	10	0	100	16	1,024	0	0
			19		100	16	1,024	0	
39	13	M	5	+	0	4,096	4,096	1,024	1
			15		50	4,096	1,024	1,024	
40	8	M	5	+	100	0	0	0	0
			15		100	0	0	0	
41	15	F	8	+		1,024	1,024	4	2
			46			1,024	1,024	4	
42	14	M	7	+	100	256	64	1,024	2
			17		250	1,024	64	1,024	
43	19	F	3		0	256	16	0	1
			13		50	64	64	0	
44	27	F							0
45	9	M	3	+	0	1,024	16	256	2
			13		50	256	16	256	
46	7	M							1
47	7	M	11			64	64	256	0
			37			256	64	256	
48	5	M	9		250				2
			79		250				
49	6 mo.	F							1
50	36	F	3			0	64	0	0
			11			0	64	0	
51	8	F	1	0	10	64	16	0	2
			11		10	64	64	0	
52	27	F	9	+	100	0	64	4	0
			19		250	0	64	4	
53	1	M							0
54	9	M	3		100	1,024	16	256	2
			20		250+	256	16	256	
55	10	M	2	+	10	64	16	4	0
			12		50	64	16	64	
56	3	M	2	+	50	4	256	16	0
			12		250	16	256	4	
57	7	M							2
58	25	M	6			0	0	0	0
			23			0	0	0	
59	4	M							2
60	7	M	4			16	1,024	16	2
			14			16	1,024	16	
61	44	F	3		0	16	0	1,024	0
			10		100	16	0	1,024	

of type 1 and 8 strains of type 3 poliovirus. The 113 patients with no indication of paralysis, with various diagnoses, including "nonparalytic poliomyelitis," "suspected meningitis," "virus meningoencephalitis," "suspected lymphocytic choriomeningitis," and "aseptic meningitis," yielded 62 viruses other than poliovirus. Identification of 61 of these agents as Coxsackie virus, immunotype B5, indicated that epidemic aseptic meningitis had resulted from infection by a single Coxsackie virus. Evidence against concurrent poliovirus infection was given by (*a*) failure to isolate poliovirus from any of the 61 patients with aseptic meningitis who yielded Coxsackie B5 virus, (*b*) insignificant

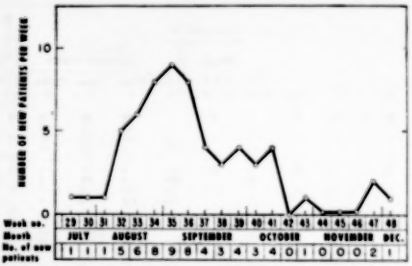
NUMBER OF NEW PATIENTS PER WEEK
10
5
0
Week no. 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
Month JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DEC.
No. of new patients 1 1 1 5 6 8 9 8 4 3 4 3 4 0 1 0 0 0 2 1

Fig. 1.—Seasonal pattern of Coxsackie B5 aseptic meningitis in Minnesota in 1956.

changes in titer of antibody in 42 paired samples of patients' serum to types 1-3 poliovirus (table 3), and (*c*) occurrence of aseptic meningitis without relation to history of vaccination with formalin-inactivated trivalent poliovaccine. Prior to outbreak of aseptic meningitis, 6 patients had received one injection of vaccine, 23 had received 2, and one had received 3; 31 had not been vaccinated.

The 61 patients with aseptic meningitis from whom Coxsackie B5 virus was isolated had become ill during the seasonal period common to annual outbreaks of epidemic poliomyelitis in Minnesota (fig. 1). The first patient who yielded Coxsackie B5 virus became ill on July 17, 1956. The greatest number of new patients per week was nine, between Aug. 26 and Sept. 1, and the onset of the last illness in this series occurred Dec. 1, 1956. The age group most commonly affected (27 of 62) was from 5 to 9 years of age; the age range was from 6 months to 45 years. Proved Coxsackie B5 aseptic meningitis was widely distributed through the Minneapolis–St. Paul metropolitan area and rural areas, particularly of Faribault, Freeborn, and Waseca Counties in southern Minnesota (fig. 2). North to Itasca and St. Louis counties, occurrence was sporadic. Throughout Minnesota this infection was concurrent with and independent of paralytic poliomyelitis (fig. 2).

Illness of the 61 patients yielding Coxsackie B5 virus was characterized by sudden onset of fever with severe headache (49 patients), stiff neck (42 patients), stiff back (11 patients), and leg pains (9 patients). All patients were febrile on admission to hospital, and for at least 56 the temperature was known to have exceeded 100 F (37.8 C). Gastrointestinal symptoms were prominent: 28 patients had one or more bouts of vomiting, 11 experienced anorexia, and 8 were nauseated. A pleocytosis, predominently lymphocytic, was demonstrated for all of the 52 patients subjected to lumbar puncture. Weakness or paralysis of limbs was not a feature of the aseptic meningitis syndrome.

Comment

Clear-cut evidence that a single antigenic type of Coxsackie virus was etiological agent of an epidemic of aseptic meningitis in Minnesota during 1956 was provided by (*a*) laboratory isolation of Coxsackie virus immunotype B5 by use of cell cultures from 61 of 113 patients suffering nonparalytic illness during the poliomyelitis season; (*b*) concurrent failure to isolate poliovirus from these patients, lack of serologic evidence for concomitant poliovirus infection, and absence of relation between illness and use of poliovaccine; (*c*) demonstration of fivefold or greater increases in titer of antibody to prototypical Faulkner B5 virus in paired serums representative of 9 of 33 patients and presence of homotypic antibody in serum samples from all but one of the remainder; and (*d*) symptoms

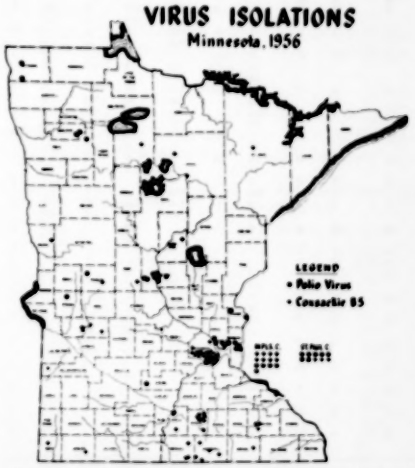

Fig. 2.—Geographical distribution in Minnesota of proved cases of aseptic meningitis due to Coxsackie B5 in 1956.

in patients yielding B5 virus compatible with diagnosis of aseptic meningitis. Etiology of the 1956 epidemic contrasts with that of previous seasonal outbreaks of aseptic meningitis, when several immunotypes of Coxsackie B virus were held responsible for clinically manifest infections. Coxsackie B5 virus had not been encountered previously in Minnesota.

Cultures of HeLa cells, cells of other human strains in continuous culture, or cells of monkey kidney in primary culture were equally useful for isolation of

wild strains of Coxsackie B5 virus; titers of fecal extracts did not differ significantly as measured by use of the different cells. This finding agreed with our earlier experience.[8]

Minnesota strains of Coxsackie B5 virus appeared to be antigenically homogeneous. Similarly, McLean and Melnick [5] found that strains of ECHO-9 (enteric cytopathogenic human orphan) virus isolated in outbreaks of aseptic meningitis near Cambridge, England, during 1955 and 1956 were antigenically indistinguishable.

Clinical features of illness in 61 Minnesota patients infected with Coxsackie B5 virus were similar to those reported by McLeod and co-workers [6] for 17 clinically manifest infections with Coxsackie B viruses and 11 symptomatic infections with ECHO-9 virus.[5] On clinical grounds alone, the syndrome exhibited by the 61 patients infected with Coxsackie B virus could not be distinguished from nonparalytic disease caused by infection with poliovirus. It is noteworthy that illnesses in rural Minnesota from infection with Coxsackie B5 virus occurred in areas free from paralytic poliomyelitis.

Results of this study provided further evidence that viral agents other than three known types of poliovirus may cause clinical illness designated as nonparalytic poliomyelitis until the causative agent is recovered and identified. The number of etiological agents of aseptic meningitis [7] clinically indistinguishable from nonparalytic poliomyelitis has been found in recent years to include Coxsackie B types 1-4,[8] ECHO viruses types 6[9] and 9,[10] and possibly Coxsackie A7 and other viruses.[11]

Summary

Coxsackie B5 virus was isolated from 61 patients in Minnesota who were ill with aseptic meningitis between July 17 and Nov. 24, 1956. Titers of antibody in 32 patients confirmed infection with Coxsackie B5 virus. Paralytic poliomyelitis was not encountered in rural localities where patients were suffering from aseptic meningitis, and serologic findings showed that these 61 patients were not concomitantly infected with poliovirus.

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We are grateful to Dr. Paul Ellwood and staff of the Elizabeth Kenny Institute and to physicians on service at University of Minnesota Hospitals for their cooperation and to Dr. Robert Barr, medical director of the state health laboratory, for permission to relate results of our laboratory studies to composite epidemiologic findings for the entire state.

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11. Footnotes 4, 7, and 8*a*, *b*, *c*, and *d*.

Hiatal Hernias.—Refinements in diagnostic technics, particularly roentgenographic and esophagoscopic, have established hiatal hernias as one of the most common lesions of the gastrointestinal tract, perhaps second only to duodenal ulcers. Marked differences of opinion exist, however, concerning the frequency with which these hernias produce symptoms. Roentgenologists, who frequently observe hiatal hernias during the performance of upper gastro-intestinal visualization as an incidental finding, probably minimize the importance of the lesion. Conversely, surgeons, often consulted after dangerous complications are apparent, could easily conclude that all hiatal hernias are dangerous. Studies of large series of cases indicate that approximately 50 per cent of patients with demonstrable hiatal hernias have significant symptoms. This is a relative figure, since the definition of significant symptoms might vary widely and the eventual outcome is unknown.—B. Blades, M.D., and E. R. Hall, M.D., The Consequences of Neglected Hiatal Hernias, *Annals of Surgery*, June, 1956.

SERUM PROSTATIC ACID PHOSPHATASE LEVELS IN PATIENTS WITH CARCINOMA OF THE PROSTATE

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and
G. Margaret Rourke, M.S., Boston

• *It is felt that determination of the prostatic acid phosphatase level has not been of value in diagnosing early carcinoma of the prostate. However, as this particular carcinoma becomes more widespread, elevation of the prostatic level does appear. Patients with a persistent elevation of the prostatic acid level above 0.7 units per 100 cc., in whom the diagnosis of carcinoma has been made histologically by biopsy, should be strongly suspected of having metastases, even though clinically the disease appears to be localized. This finding, therefore, would weigh heavily against surgery, other than for the purpose of palliation.*

Within recent years considerable enthusiasm has been expressed over use of prostatic serum acid phosphatase levels in the clinical evaluation of patients with carcinoma of the prostate. Since the original investigation of Gutman and Gutman [1] in 1938, the total serum acid phosphatase level has been a useful guide in the diagnosis of prostatic cancer. Further specificity was given to this enzyme system when Abul-Fadl and King [2] demonstrated a distinct difference between the acid phosphatase of prostatic origin and that produced by the liver, spleen, and red blood cells. The hydrolysis of phenyl phosphate by the acid phosphatase enzyme was found to be partially inhibited by the addition of L-tartrate, and it was postulated that the portion that was inhibited was produced by the prostate. Subsequently, their work was extended and given clinical application by Fishman and Lerner.[3] They reported that all patients with active carcinoma of the prostate demonstrated an elevated prostatic fraction, and, recognizing the possible value of the test in the differential diagnosis of carcinoma of the prostate, they suggested that the prostatic fraction might be elevated in patients exhibiting a normal total acid phosphatase level.

Other investigators since have studied this enzyme system, and a multitude of claims and counterclaims have been made for the clinical significance of its levels. At present, it is well established that there is an elevation of the serum acid phostatase level in about 80% of patients with untreated metastatic carcinoma of the prostate and this elevation is a reflection of the increased level of the prostatic acid phosphatase.

From an extensive study by Cline and co-workers [4] of 1,106 patients with and without prostatic disease, it was apparent that elevation of the prostatic acid phosphatase level above 0.7 units per 100 cc. showed a high degree of correlation with prostatic cancer. It was also apparent, however, that there was considerable interference from false-positive values, in the order of 5 to 8% in patients with benign prostatic hypertrophy and up to 10% in a group without malignant disease. Moreover, they reported finding elevations above 1.5 units per 100 cc. only in prostatic carcinoma. The sources of error resulting in these falsely high values have been recently reviewed by Ozar and co-workers [5] and include such factors as hemolysis, deterioration of the specimen due to time and heat, previous x-ray therapy, prostatic manipulation, human error, and other diseases associated with elevation of both the serum and prostatic acid phosphatase levels. Because of this high incidence of erroneous elevations, many clinicians, failing to understand the reasons for them, became prematurely discouraged with the test and discarded it completely.

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With the refinement of acid phosphatase determinations and the subdivision of the level into serum and prostatic fractions, it was originally hoped that the use of this more sensitive method would permit earlier diagnosis of prostatic carcinoma. Fishman and associates [6] reported that four out of a total of five patients with localized prostatic cancer showed an elevated prostatic fraction in the presence of a normal total serum acid phosphatase level. The striking diagnostic implications of this became readily apparent. That such elevations may be the exception rather than the rule, however, was presaged in the literature much earlier when Woodard [7] found that tissue extracts of prostatic carcinoma contained considerably less acid phosphatase than normal gland tissue. This has recently been corroborated by Marberger and co-workers.[8] In view of this, it would be difficult to postulate the presence of an elevated prostatic acid phosphatase level in all cases of minimal carcinoma. In fact, one wonders if the disease actually must not be rather extensive before detectable elevations exist.

Finally, the significance of serum and prostatic acid phosphatase levels in the long-term management of patients with carcinoma of the prostate must be raised. It has been held that the prostatic fraction provides a more sensitive index of prostatic cancer activity than does the total serum level in patients on hormonal therapy and, therefore, is of superior clinical importance.

Because our data seemed at variance with some of these previous observations and, yet, because we feel there is definite merit in prostatic acid phosphatase determinations, the present study was undertaken. In an effort to establish certain positive criteria for the selection of patients upon whom these difficult laboratory studies should be done, we have chosen to evaluate the prostatic acid phosphatase level as to, first, its role per se as a diagnostic test for cancer; second, its function in detecting local as opposed to metastatic disease; and, third, its superior significance over the total level in the long-term management of patients with prostatic cancer. With these questions in

mind, 88 patients, including 79 with carcinoma of the prostate, have been studied, and it is the purpose of this paper to record our experience in these unsettled areas.

Method and Normal Values

The records of the patients for this study were taken from the urologic service of the Massachusetts General Hospital, Boston, during the years 1954-1956. The selection of patients was dictated primarily by the availability of the record and the completeness of the examination. Each case listed has been thoroughly investigated. All diagnoses have been established by histological examination, and all cases studied have been included.

The method of determining the total and prostatic acid phosphatase levels used is that described by Fishman and Lerner. It involves the hydrolysis of disodium phenyl phosphate by the serum when incubated for a period of three hours at 38 C, both in the absence and in the presence of 0.2 M L-tartrate. The difference found in the amount of phenol liberated represents the inhibition of acid phosphatase of prostatic origin. Activity is defined as milligrams of phenol liberated by 100 cc. of serum and is usually expressed as King-Armstrong units. These properly should be referred to, however, as Gutman units because the analytic procedure now employed is the modification by Gutman and Gutman[9] of the King-Armstrong method for detecting alkaline phosphatase activity. In this study, all determinations were done immediately after 10 cc. of blood was drawn from the patient in a fasting state, and in each case, except where indicated, the test was done prior to any operative procedure.

The normal values for total and prostatic acid phosphatase remain a matter for some debate. The upper limit of normal for the total serum acid phosphatase was originally placed at 2.5 units by Gutman and Gutman.[1] Later, they revised this figure downward to 2.0 units.[8] Since then, a number of other estimates have been made; Fishman and co-workers placed the limit at 5.0 units while Day and co-workers,[10] in a comprehensive survey of the problem, arrived at the figure of 3.84 units. Mathes and co-workers [11] state that 3.5 units should be the maximum, and we are inclined to agree with this figure. As regards the prostatic acid phosphatase level, the upper limit of normal has been taken to be 0.5 units by Fishman and Lerner, 0.55 units by Day and co-workers and 0.7 units by Cline and co-workers.[4] We have temporarily accepted this last figure, because of the many determinations in this range we have found in normal subjects. Our normal values, therefore, are not grounded in statistical evaluations, rather they are based upon our own clinical impressions, coupled with previously reported laboratory data.

Results

For the purpose of analysis and discussion, the patients have been divided into six groups, relating to their clinical status as regards the extent of the carcinoma and, in some cases, to the type of previous therapy. We feel that certain trends, which as yet have not been reported, become evident from these groupings, and these are best discussed under the individual groups.

Group 1.—The first group is composed of patients in whom the carcinoma was limited entirely to the prostate itself, without evidence of local extension or distant metastases. The results of the phosphatase studies are listed in table 1.

The patients in cases 1 through 7 were ones in whom a minute focus of carcinoma was found after multiple sections were made of tissue removed at the time of prostatectomy. The patients in the remaining cases, 8 through 17, were those in whom the disease was more extensive, generally involving more than one lobe. It will be seen from the table that only one patient, in case 9, demonstrated an elevated prostatic acid phosphatase level of 0.8 units per 100 cc. The levels in the others were well within normal range, and in every case the total acid phosphatase level was normal. Thus, from a group of 17 patients with carcinoma found to be limited to the prostate itself by all available clinical, x-ray, and histological evidence, only one showed any elevation of the prostatic acid phosphatase level. These data are in disagreement with certain published reports and point to the inadequacy of the test in detecting early carcinoma.

TABLE 1.—*Data on Serum and Prostatic Acid Phosphatase Levels in Patients with Carcinoma Confined to Prostate*

Case No.	Acid Phosphatase Levels, Units/100 Cc.	
	Total	Prostatic
1	1.6	0.2
2	3.3	0.6
3	1.4	0.2
4	1.1	0.3
5	1.5	0.0
6	1.6	0.4
7	0.7	0.4
8	2.3	0.1
9	2.2	0.8
10	2.7	0.5
11	1.3	0.0
12	1.5	0.3
13	1.4	0.4
14	0.6	0.2
15	1.2	0.0
16	2.1	0.0
17	1.8	0.3

Group 2.—A separate grouping was made of patients with further extension of the disease. In these cases, either there has been invasion of the seminal vesicles demonstrated microscopically in the specimen taken during radical perineal prostatectomy, or the clinical impression of seminal vesicle invasion with cancer has been borne out by Silverman needle biopsy of the tumor mass. Again, in this group there were no demonstrable distant metastases, and the remainder of the periprostatic tissue seemed free of disease by clinical or microscopic findings or both. Table 2 summarizes these results and shows that, of a total of 16 patients, only 1 showed an elevated prostatic acid phosphatase level. This was in the patient in case 33 who had a level of 0.8 units per 100 cc. and in whom microscopic examination of a section of the biopsy specimen demonstrated tumor extending into the prostatic urethra at the line of resection. None of these patients had an elevated total serum level, and the prostatic acid phosphatase levels were generally under 0.5 units per 100 cc.

Group 3.—Table 3 lists the data from a third group of patients, consisting of those who had distant soft tissue or bone metastases or who had very extensive

local disease, with the prostate usually fixed to the pelvic wall. None of these patients had any therapy, operative or hormonal, prior to the phosphatase determinations. Unlike the patients in group 2, each of these patients demonstrated an elevation of the prostatic acid phosphatase level except for two patients, the patient in case 48, in whom x-ray diagnosis of metastasis was not clearly established, and the one

TABLE 2.—*Data on Acid Phosphatase Levels in Patients With Carcinoma of Prostate With Involvement of Seminal Vesicles but Without Other Extension or Known Metastasis After Operation Procedures*

Case No.	Operation	Acid Phosphatase Levels, Units/100 Cc. Total	Prostatic
18	Radical perineal prostatectomy	0.5	0.2
19	Silverman needle biopsy	2.0	0.6
20	Silverman needle biopsy	1.0	0.1
21	Perineal biopsy	1.6	0.6
22	Silverman needle biopsy	1.4	0.6
23	Transurethral prostatic resection	0.5	0.2
24	Radical perineal prostatectomy	1.8	0.5
25	Silverman needle biopsy	1.3	0.3
26	Silverman needle biopsy	1.6	0.0
27	Silverman needle biopsy	1.2	0.4
28	Silverman needle biopsy	1.2	0.2
29	Silverman needle biopsy	1.6	0.2
30	Radical perineal prostatectomy	1.4	0.3
31	Radical perineal prostatectomy	1.9	0.2
32	Radical perineal prostatectomy	1.6	0.1
33	Radical perineal prostatectomy	1.8	0.8

in case 34, who showed a normal prostatic level and elevated total serum level. Unfortunately, the determinations were not repeated. Two of these 15 patients showed an elevated prostatic level with a normal total serum acid phosphatase level. The degrees of elevation of the prostatic acid phosphatase level were quite varied and did not seem related to the extent of disease as demonstrated by x-ray. It appears from this, then, that elevations of the prostatic phosphatase levels

TABLE 3.—*Data on Acid Phosphatase Levels in Patients with Extensive Local Disease or Distant Metastasis Who Had Not Undergone Therapy Prior to Determinations*

Case No.	Clinical Status	Acid Phosphatase Levels, Units/100 Cc. Total	Prostatic
34	Extensive bony metastases	5.2	0.7
35	Cervical node metastases	2.3	1.1
36	Spine and pelvic metastases	24.	23.5
37	Rib metastases	12.1	12.1
38	Cervical node metastases	6.9	3.7
39	Pelvic metastases	13.8	10.2
40	Extensive bony metastases	3.2	1.0
41	Extensive bony metastases	11.5	4.6
42	Prostate fixed to pelvic wall	10.8	8.9
43	Extensive bony metastases	21.9	14.4
44	Extensive bony metastases	24.6	20.1
45	Extensive local disease	2.3	0.9
46	Prostate fixed to pelvic wall	2.9	1.2
47	Bone metastases	9.8	8.5
48	Extensive local disease and possible spine metastases	1.5	0.2

become manifest only when there has been considerable local extension or distant metastasis of the disease. In several of these patients, there was marked elevation of both the total and prostatic phosphatase levels in the presence of nodal but not bony metastases, indicating either that elevations can occur without metastasis to bone or that the metastases were too small to be demonstrated roentgenologically.

Group 4.—Group 4 comprises the largest single group and consists of patients with carcinoma of the prostate who previously had hormonal therapy or orchiectomy or both prior to the acid phosphatase determinations. Without exception, each of these 21 patients, at the time of the phosphatase studies, was considered to have progressing disease even though there may have been an initial remission due to the endocrine therapy. They were hospitalized at this time because of severe bone pain or obstructive symptoms from local recurrence. The diagnosis of carcinoma was established at the time of the initiation of therapy by Silverman needle biopsy in all patients who either had undergone bilateral orchiectomy or had simply received estrogen therapy. The duration of estrogen therapy is difficult to assess, but in most cases it was continued from the beginning of therapy until the acid phosphatase study was made.

The data from this group are summarized in table 4. From a total of 21 patients, only 5 demonstrated elevated serum acid phosphatase levels, and each of

TABLE 4.—*Data on Acid Phosphatase Levels in Patients with Prostatic Carcinoma Who Had Received Previous Hormonal Therapy or Had Undergone Orchiectomy and Are Now in Exacerbation*

Case No.	Type and Year of Previous Operation	Year of Estrogen Therapy	Acid Phosphatase Levels, Units/100 Cc. Total	Prostatic
49	TUR* and orchiectomy, 1950	...	3.5	1.0
50	Orchiectomy, 1952	1952	4.6	0.8
51	Orchiectomy, 1954	1953	20.6	18
52	Orchiectomy, 1950	...	21.3	14.3
53	Orchiectomy, 1947	...	0.2	0.1
54	Orchiectomy, 1951	1951	2.0	0.3
55	TUR* and orchiectomy, 1953	...	3.0	0.0
56	Orchiectomy, 1951	1951	2.4	0.1
57	TUR* and orchiectomy, 1953	1953	1.0	0.3
58	Suprapubic prostatectomy and orchiectomy, 1948	...	1.4	0.3
59	Orchiectomy, 1947	1947	1.4	0.2
60	Orchiectomy, 1952	1952	0.9	0.1
61	Orchiectomy, 1951	1951	1.5	0.5
62	TUR* and orchiectomy, 1952	1952	2.6	0.9
63	TUR* and orchiectomy, 1954	...	2.3	0.0
64	Orchiectomy, 1943	1943	0.7	0.4
65	Radical perineal prostatectomy, 1952	1943	17.2	13.3
66	...	1951	10.1	6.9
67	TUR* and orchiectomy, 1950	...	2.3	1.4
68	Orchiectomy, 1954	...	2.1	0.0

* TUR, transurethral prostatic resection.

these had a concomitant elevation of the prostatic fraction. Three of the remaining 16 had an elevated prostatic level and a normal total serum level, and the rest of the group had normal values for both. Again, there seemed to be no correlation between the extent of elevation and the extent of the disease as seen clinically. One of the patients with the most extensive disease, case 62, showed only an elevation of the prostatic level to 0.9 units per 100 cc. with a normal serum level. These data therefore suggest that once there is a remission due to hormonal therapy, with subsequent further progression of the disease, there need not be a secondary elevation of the prostatic level. Each of these patients was considered to have extensive disease initially, and presumably at least 80% would have shown elevations of the prostatic acid phosphatase level when therapy was begun. The fall to normal levels is indicative of successful hormonal control of the disease, but that these levels failed to rise again in 13 out of 21 patients in clinical relapse points to the inadequacy of the test in follow-up of patients through remissions and exacerbations.

It has been postulated that the prostatic acid phosphatase fraction is a much more sensitive index of tumor activity than the total acid phosphatase in

patients treated by hormonal therapy. Our data, however, do not bear this out. Clearly, more extensive investigation of a similar group is necessary before any positive generalizations can be drawn. Thus far it appears that, although determination of the prostatic acid phosphatase level may be a superior test in the initial regulation of patients being treated by hormonal therapy, it has not shown a similar superiority in patients who are in relapse, and, in fact, more often than not, neither the total serum or the prostatic levels will show a secondary rise with later progressive disease. For the present, it would seem that the serum acid phosphatase determinations alone provide all the useful information available for the clinical

TABLE 5.—*Data on Acid Phosphatase Levels in Patients with Radical Perineal Prostatectomy with No Hormonal Therapy Prior to Determinations*

Case No.	Date of Operation	Clinical Status of Patient at Time of Acid Phosphatase Determinations	Acid Phosphatase Determination: Date	Total, Units/100 Cc.	Prostatic, Units/100 Cc.
69	11/13/48	Local recurrence	10/18/54	1.6	0.2
70	12/31/51	Bony metastases	10/ 5/54	1.7	0.5
71	3/27/54	Bony metastases	6/15/54	2.7	1.2
72*	1947	No evidence of recurrence on TUR† or x-ray examination	10/29/54	5.1	3.3
73	1941	Extensive bone and lymph node metastases	7/13/54	3.8	0.5
74	1951	Local recurrence and bone metastases	6/ 8/54	2.0	0.3
75	1949	No evidence of recurrence	5/14/54	1.8	0.0
76	2/27/53	No evidence of recurrence	12/ 7/54	2.2	0.1
77	1951	Bony metastases	2/28/56	7.9	5.3
78	3/25/53	Bony metastases	6/ 8/54	10.2	10.2
79	4/13/56	No evidence of recurrence	4/30/56	1.7	0.1
18	4/22/56	No evidence of recurrence	8/ 2/56	1.5	0.0

* Patient died 2 mo. postoperatively and was found to have extensive bone and soft tissue metastases.
† TUR, transurethral prostatic resection.

management of patients with extensive disease whose conditions have been brought under successful control with hormone therapy or orchiectomy.

Group 5.—Table 5 summarizes the findings in 11 patients who had been treated for prostatic carcinoma by radical perineal prostatectomy at some time in the past and who had not received endocrine therapy. The clinical status of each patient, as adjudged by the same criteria for all other patients, is listed, along with the date of operation and the date and result of the phosphatase determinations. Eight of these patients had a recurrence of disease. A significant feature of these data appears in the fact that the four patients without evidence of recurrence showed very low prostatic fractions, 0.1 units or less per 100 cc., and it is in patients with previous radical prostatectomy that routine determination of the prostatic fraction may be worthwhile.

Four of the eight patients with recurrence had prostatic acid phosphatase levels in the range of 0.2 to 0.5 units per 100 cc., and we hope to accumulate further cases to bear out our presentiment that an elevation of the prostatic level into this range in a patient who had undergone previous radical prostatectomy may serve as a useful danger signal indicating recurrence. Our data thus far are merely suggestive.

Group 6.—The pertinent data from nine patients in whom we found an elevated prostatic fraction without evidence of prostatic carcinoma are listed in table 6. As can be seen, the follow-up studies were done at intervals of from one week to nearly a year. Every patient was subjected to the same battery of studies as were all others with suspected carcinoma of the prostate. In each case the acid phosphatase levels were determined one or more days after a digital rectal examination, and, in cases 85 and 86, the tests were done prior to the operation. Elevations of the prostatic fraction from 0.8 to 2.5 units per 100 cc. were encountered in patients with benign prostatic hypertrophy and other diseases. These levels returned to normal in five of seven patients after prostatectomy, although, in cases 85 and 86, the elevations persisted. It should be emphasized that the elevation in the prostatic acid phosphatase level in the patient in case 83, which was 2.0 units per 100 cc., was found the day after a Silverman needle biopsy, again pointing up the caution that must be exercised in interpreting the levels after prostatic manipulation.

These data confirm the suspicion that elevations of the prostatic acid phosphatase level above 0.7 units per 100 cc. are possible in patients who do not have prostatic carcinoma and that even elevations above the level of 1.5 units are not diagnostic of carcinoma. That these are not merely laboratory errors is supported by the fact that certain of these elevations persisted on repeat determinations. They more likely represent false-positive values in patients who for unexplained

TABLE 6.—*Data on Patients with Elevated Levels of Prostatic Acid Phosphatase and Without Evidence of Carcinoma of Prostate*

Case No.	Diagnosis	Operation	Acid Phosphatase Determination: Date	Total Units/100 Cc.	Prostatic, Units/100 Cc.
80	Benign prostatic hypertrophy	Suprapubic prostatectomy, 12/1/54	11/30/54 12/14/54	3.0 2.5	1.2 0.6
81	Benign prostatic hypertrophy	Suprapubic prostatectomy, 5/6/54	5/ 5/54 4/12/55	1.5 1.7	0.8 0.4
82	Bladder neck stricture after suprapubic prostatectomy	Transurethral prostatic resection, 8/17/55	8/16/55 6/ 8/56	2.5 1.4	1.2 0.0
83	Benign prostatic hypertrophy	Silverman needle biopsy, 8/25/56, and transurethral prostatic resection, 8/29/55	8/26/55 6/ 5/56	2.7 2.1	2.0 0.0
84	Choroidal melanoma and benign prostatic hypertrophy	Perineal prostatectomy, 9/30/55, and enucleation of tumor of right eye, 10/11/55	9/23/55 9/27/55 6/ 5/56	3.8 2.7 2.0	2.5 1.3 0.1
85	Benign prostatic hypertrophy	Suprapubic prostatectomy, 5/29/55	5/29/55 4/ 5/55	2.0 3.0	1.4 1.4
86	Benign prostatic hypertrophy	Transurethral prostatic resection, 12/6/55	12/ 6/55 12/13/55	2.2 1.6	0.9 0.8
87	Diabetic radiculopathy	...	3/14/55 4/ 4/55	2.5 2.1	1.1 0.4
88	Benign prostatic hypertrophy and bleeding hiatal hernia	...	4/ 5/56 6/29/56	1.4 1.8	1.4 0.2

reasons have a transient or persistent elevation of the level of the prostatic fraction. Interestingly enough, in two of these patients the elevations did not return to normal after a simple prostatectomy.

Comment

As was pointed out originally, the purpose of this study is to assess the absolute value of the prostatic acid phosphatase determinations in patients with carcinoma of the prostate. Fishman and Lerner have offered the theory that the level of the prostatic frac-

tion frequently is elevated in patients with localized carcinoma before the total acid phosphatase rises to abnormal levels; the test, therefore, would be of immeasurable diagnostic aid in evaluating patients with suspected carcinoma. Our experience, however, has not borne this out. In a group of seven patients with histologically proved minute foci of carcinoma, none showed abnormal elevations of the levels of either the total acid phosphatase or the prostatic fraction. Of a total of 17 patients whose disease was limited to the prostate, only 1 had an elevation of the prostatic level, this being to 0.8 units per 100 cc. The recognized percentage of false-positive values in this test is in the order of 4 to 8%, and this elevation is considered to be in keeping with this incidence. Possibly, however, this patient has undetected distant metastases producing the enzyme; thus far our follow-up period is only two months. From these data, we believe that the level of the prostatic fraction does not show elevations in patients in whom disease is limited completely to the prostate. Consequently, we feel that the determination of the prostatic acid phosphatase level has not been of value in diagnosing early carcinoma. Even as the disease spreads into the seminal vesicles, the prostatic level remains within the normal range. As it becomes still more widespread, however, elevation of the prostatic level appears, and, in a group of 15 patients with extensive disease, 13 were found to have elevated prostatic acid phosphatase levels. Four of these 13 had a normal total acid phosphatase level, and, from our entire group, each patient with a substantial elevation of the prostatic level was found to have disease spread far beyond the confines of the prostate and the seminal vesicles.

Several workers [1,4] have reported a decreased activity of the acid phosphatase enzyme in tissue extracts of prostatic carcinoma as compared with that in normal or hypertrophied glands. It has been proposed that the occurrence of metastasis may be associated with the breakdown of barriers that exist in the prostate itself, preventing the escape of acid phosphatase into the circulation, and thus far our clinical evidence lends credence to this theory. Qualitative differences may exist between the acid phosphatase enzymes liberated by normal and neoplastic prostatic tissue, and the hope remains that further refinements of our present methods of determination will permit earlier detection of carcinoma.

For the present, we do submit the premise that the levels of the prostatic fraction as we are now able to measure them may be of extreme value in patients apparently with localized disease, histologically verified, who are about to undergo radical surgery. Because of the natural history of this type of carcinoma, it is possible to have apparently well-localized disease associated with distant, extensive, and otherwise undetectable metastases. It has been clearly established that only about one-half of the actual instances of bony metastases can be detected by x-ray examination. We are of the opinion that patients with a persistent elevation of the prostatic acid phosphatase level above 0.7 units per 100 cc., in whom the diagnosis of carcinoma has been made histologically by biopsy, should be strongly suspected of having metastases, even though clinically the disease appears to be localized. Therefore, these patients are questionable candidates for radical perineal prostatectomy, except for the purpose of palliation to avoid the distressing symptoms of bleeding, obstruction, and bladder irritation.

We have not attempted statistical evaluation of these data, because our series is too small to allow valid statistical conclusions. Necessarily, the experience of any single urologic service is limited, and considerable time must elapse before a sufficiently large number of case reports accumulate. Because of the conflicting reports that have appeared, it becomes imperative that carefully obtained data be reported from other centers in order that investigation of these problems may be carried to a satisfactory conclusion.

Summary

Eighty-eight cases, including 79 cases of carcinoma of the prostate, have been studied with reference to the value of serum and prostatic acid phosphatase levels in clinical evaluation. Of a total of 17 patients with carcinoma localized to the prostate gland, only 1 had an elevated level of prostatic acid phosphatase and all had normal levels of total acid phosphatase. These findings are in conflict with previously reported studies and indicate that in our hands these tests have been of little value in the detection of early carcinoma.

Elevations of the levels of the prostatic fraction were found in patients with either very extensive local disease or metastasis, although demonstrable bone metastases were not present in all patients with abnormally high levels. We believe that prostatic acid phosphatase levels may be of extreme value in patients with histologically verified carcinoma who are about to undergo radical perineal prostatectomy; elevations above 0.7 units per 100 cc. weigh heavily against surgery because of the likelihood of existing distant metastases.

Many patients with widespread prostatic carcinoma, after an endocrine-induced remission, will not have concomitant elevations in the prostatic acid phosphatase levels when the disease again becomes progressive, indicating that under these conditions the test is a poor index of tumor activity and is no better than the total serum acid phosphatase level alone. The data suggest also that the test may be of value in following patients after radical prostatectomy; slight elevations above the usual very low level may indicate recurrence of disease.

275 Charles St. (14) (Dr. Kerr).

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12. Footnotes 7 and 8.

NEW SET OF TYPE A INFLUENZA VIRUSES

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The Public Health Service has been asked to summarize for THE JOURNAL *some of the technical information currently available about the new influenza situation. The Communicable Disease Center of the Public Health Service maintains a Respiratory Disease Unit in the Virus and Rickettsia Section in Montgomery. This unit is responsible for the World Health Organization International Influenza center for the Americas. As chief of this unit, many of the observations made concerning the new viruses have been communicated to the author of the following article by investigators in virus laboratories elsewhere, especially those at Walter Reed Army Institute of Research, the School of Public Health in the University of Michigan, and the influenza centers in London and Geneva. The earliest data and evidence derived by teams of U. S. Army investigators have been reported.*[1] *Priority and responsibilities for each observation will be established in this conventional manner with publication of completed studies by the individual investigators in suitable journals.*—ED.

• *Four major immunological types of virus (A, B, C, and D) are now known to cause influenza; each comprises a completely distinct group. Within type A are variants with marked antigenic differences, and groups of these strains comprise sets or families. In May, 1957, representative strains from a new set, now termed Far East (FE) or Asian influenza A were isolated from epidemics of influenza in Singapore. Only slight antigenic similarity is evident between the FE viruses and other type A influenza strains. Serologic diagnosis may be made with either hemagglutination-inhibition or complement-fixation tests with the new antigens.*

The phenomenon of antigenic variation among the viruses which cause influenza has been recognized since the earliest vaccine trials as a basic problem in development of effective control of the disease by immunization.[2] Four major immunological types (A, B, C, and D) are now known, and these comprise completely distinct groups of viruses. Marked antigenic differences among strains within types A and B have appeared with some regularity. Observations made with viruses isolated during the last 24 years indicate that these variations may be summarized as four serologically intersecting sets of type A strains. These groups have been referred to as sets or families[3] and previously included the Swine, PR8, and FM1 sets of strains. Each has been successively responsible for type A influenza for a period of years. Serologic evidence has been obtained that strains of the antigenic nature of the Swine set probably caused pandemic influenza in 1917-1919, remained in circulation 5 to 10 years, and then vanished.[4] The first isolates from humans were distantly related to the Swine set, and clearly constitute another group, that is, the PR8 set. Type A influenza strains prevalent during the years 1933-1943 were members of this later group, as shown by observations of protective effect of vaccination, antigenic analysis of strains, and seroepidemiologic considerations of strains. In 1946-1947 the FM1 set or A-prime viruses completely replaced the earlier groups, and the etiological agents of influenza A have been variants within the FM1 set during the last 10 years on a world-wide basis. The emergence of a new group of strains has been expected.[5] Available evidence strongly indicates that the fourth set of strains has evolved this year and can be expected to replace the FM1 set or A-prime isolates. These new viruses were first isolated in May, 1957, from epidemics of influenza in Singapore and are now termed Far East (FE) influenza A.[6] This designation is greatly preferred over an A–double prime or similar name.

From the Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare.

Antigenic Relationships

The modifications of antigenic structure among strains in earlier sets have been followed with interest.[3] Early in 1956, virus isolates from Holland, Canada, the United States, England, India, Hawaii, and elsewhere were found to be sharply different from strains circulated in previous years, although they were clearly in the FM1 set. This group was called the "Dutch 56" by English investigators.[7] Strains isolated in Japanese epidemics in December, 1956, were antigenically similar to the Dutch 56 strains. Influenza cases which occurred from January through March, 1957, in many

areas of the United States, Europe, and Asia were caused by influenza A viruses closely related to the Dutch 56 strains. The FE isolates are distinctly different in antigenic comparisons with all earlier type A viruses. Typical results of hemagglutination-inhibition tests with serums from convalescent ferrets and immunized chickens and several strains of types A, B, C, and D influenza are presented in table 1. Although different titers will be obtained with the use of various lines of each virus and serums from other animals or from bleedings at different times after immunization, these results appear to indicate to fair degree the antigenic relationships which exist among these viruses. Comparable data have been obtained with serums against several other type A isolates.

The isolates have been given designations by influenza centers which indicate the antigenic type and the geographical location of the laboratory which made the isolation or where the case occurred and the year of isolation. A number before the year differentiates between isolates and may identify the laboratory responsible for obtaining the virus. Thus, strains with the block of numbers 300-400 have been forwarded by the Walter Reed Army Institute of Research. Exceptions to this rule are A/Swine/1976/31, which is the virus isolated from pig no. 1976 by Dr. Shope, and the C/JJ/50, where the letters "JJ" are initials from a patient's name.

With the possible exception of a slight reaction between the A/Denver/57 virus and antiserum against the FE isolate A/Japan/305/57, no antigenic similarity is evident between the FE virus and other influenza strains. In contrast to these results, titers obtained with the A/Hawaii/56 and A/Denver/57 isolates indicate a very close antigenic relationship. These viruses also cross-react to a high degree with "Dutch 56" viruses and all influenza virus isolations made during the period from January to April, 1957, from many areas of the world. The dotted line is to draw attention to the reactions noted between these isolates and the FM1/47 and Mal/54. These results indicate that all four are in a set but that the 1956-1957 isolates may be sufficiently different to alter the formula for a polyvalent influenza vaccine. Antigenic intersection between later sets and those of which Swine/31 and PR8/34 are prototype strains can be seen by the low antibody titers. No reactions were found between the strains from different types (A, B, C, and D).

The FE viruses are also set apart by results obtained with virus neutralization tests using virus infection in embryonate eggs as the index of serum-virus interaction.

At least 20 isolates have been typed as members of the new set, including agents from epidemics in Asia and Europe and sporadic cases in the United States and elsewhere.[6b] Although slight differences are noted in cross tests among these viruses, all are closely related antigenically and comprise a new group, or the fourth set of type A influenza viruses.

The relationship to the older type A strains is evident from results of complement-fixation tests. Both allantoic fluids and membrane extracts from embryonate eggs infected with the new agent have been demonstrated to contain high concentrations of influenza A antigens. Data presented in table 2 confirm other observations that the A/Japan/305/57 (FE) strain is a type A influenza virus and that it may be more closely related to A/Denver/1/57 than to A/PR8/34. These results were obtained using a standard overnight fixation method and demonstrate that viral antigens in allantoic fluids gave a more specific reaction than did the membrane extracts which contained a high concentration of "soluble" antigen. The membrane extracts had been absorbed with erythrocytes to remove viral particles.

TABLE 1.—*Results of Cross Hemagglutination-Inhibition Tests*

Isolates	Antiserum									
	Swine/31	PR8/34	FM1/47	Mal/54	Haw/56	Den/57	(FE) Japan /305*	GL/54	JJ/50	Send/52
A/Swine/31	1,600	0†	50	0	0	0	0	0	0	0
A/PR8/34	0	1,600	50	0	100	400	0	0	0	0
A/FM1/47	50	0	3,200	200	50	50	0	0	0	0
A/Malaya/54	0	0	1,600	1,600	100	400	0	0	0	0
A/Hawaii/56	0	0	50	0	3,200	6,400	0	0	0	0
A/Denver/57	0	0	0	0	1,600	12,800	50‡	0	0	0
A/Japan/305/57	0	0	0	0	0	0	800	0	0	0
B/GL/54	0	0	0	0	0	0	0	400	0	0
C/JJ/50	0	0	0	0	0	0	0	0	800	0
D/Sendai/52	0	0	0	0	0	0	0	0	0	1,600

* Chicken serum against prototype strain of Far East (FE) A; other serums are from ferrets after infections with the designated isolates.
† 0=no inhibition of 4 hemagglutinating units by 1:50 dilution (final).
‡ Inhibition noted with 2 pools of chicken serums but not with 2 other pools.

Growth in Eggs, Tissue Culture, Mice and Ferrets

Strains of the FE set have a host range and in vitro behavior similar to other type A influenza viruses. Isolations from throat washings are readily accomplished by standard methods using the chick embryo amniotic sac.[8] Allantoic fluids harvested from infected embryonate eggs contain concentrations of 10^8 to 10^9 egg infectious doses per milliliter. No notable differences in titers were obtained when eggs were incubated at 35 C rather than 37 C. Concentrations of virus as measured by hemagglutination of guinea

pig, human, or chicken erythrocytes have been comparatively low (100 to 200), even when the eggs were injected with highly diluted seed or treated cortisone. An exception to this observation has been with the recently acquired isolate, A/Formosa/313/57. Eleven-day embryonate eggs inoculated with this strain by the allantoic route and incubated for 48 hours at 37 C have repeatedly yielded pools of allantoic fluids with hemagglutinin titers of 1:800.

Fluids from eggs inoculated with strains of the FE set contain virus particles in the filamentous and spherical forms.* Similar pleomorphism has been demonstrated with many type A strains by electron photomicrography or with the light microscope using darkfield illumination or staining with impregnation

TABLE 2.—*Antibody Titers from Complement-Fixation Tests with Serums from Recently Infected Humans* or Ferrets*

Antigens	Human Serums		Ferret Serums	
	Acute	Convalescent	Acute	Convalescent
A/Japan/305/57				
Allantoic fluid	< 8	64	< 8	64
Membrane extract	< 8	128	< 8	64
A/Denver/1/57				
Allantoic fluid	< 8	64	< 8	128
Membrane extract	< 8	64	< 8	64
A/PR8/34				
Allantoic fluid	< 8	< 8	< 8	< 8
Membrane extract	< 8	64	< 8	32
B/GL 1739/54				
Allantoic fluid	< 8	< 8	< 8	< 8
Membrane extract	< 8	< 8	< 8	< 8

* Infections with strains similar to A/Denver/1/57.

procedures.[7] These observations may account for the usually low hemagglutinin titers obtained and antigenic behavior noted with several of the FE isolates. Investigations concerning the significance of these forms in fluids from infected eggs have demonstrated that the long fibers will agglutinate cells and have the antigenic specificity of spherical virus particles; however, they are believed to be infective only at one end.[10] Future work with these viruses is indicated to clarify the nature of the various forms.

It was of interest to find that the FE isolate, A/Japan/305/57, would agglutinate sheep erythrocytes. After observations in complement-fixation tests with the virus in allantoic fluids as the antigen, comparative hemagglutination titrations were carried out with 1% suspensions of sheep erythrocytes and 0.5% chicken red blood cell suspensions at 4 C and room temperature. At either temperature this virus in allantoic fluids diluted in the usual phosphate-buffered saline solution caused the formation of the typical patterns with both sheep and chicken cells in titers of 1:100. In contrast, the several other type A strains isolated in previous years did not agglutinate the sheep cells. In this respect the FE isolate behaves more like type B strain Lee/40, which also agglutinated sheep cells at both temperatures. The significance of these observations is not yet clear. Although it has been suggested that the strength of the virus-cell bond varies with strains of virus and the species of animals from which the erythrocytes are obtained,[11] further work must be carried out to permit additional speculation.

Very limited information has been obtained concerning the growth of FE viruses in tissue culture, mice, and ferrets. Virus in allantoic fluids from infected eggs will multiply in monolayer monkey kidney cultures as seen by an increase in hemagglutinin infectivity and slight cytopathogenic changes. The concentration of virus produced is similar to that found with many egg-adapted type A strains with hemagglutinin titers in the 10-100 range.[12]

The new viruses also grow in mice and ferrets after intranasal inoculations. Characteristic lung consolidation was found in mice 3 to 10 days after they were given allantoic fluids containing 10^6 egg infectious doses of any of several FE isolates. The viruses have been maintained by several lung-to-mice transfers; however, after five passages lesions were no longer noted, indicating that many of the pathological changes in the first mice were probably due to toxicity, as seen with other influenza viruses.[13] Studies concerning the virulence of these viruses are being continued.

Serologic Behavior in Laboratory Tests

It was early recognized that many of the FE influenza isolates were very sensitive to nonspecific inhibitors in heated serums which are not antibody and therefore interfere with interpretation of results from hemagglutination-inhibition (HI) tests. Furthermore, the treatment of serums with trypsin, periodate, or Vibrio cholerae extracts[14] did not remove these troublesome inhibitors. Two of the isolates, A/Japan/305/57 and A/Formosa/313/57, were not sensitive, however, and a majority of the tests have been carried out with these strains. Lines of these viruses established by transfers in ferrets and mice and subsequently in eggs appear more capable of combining with antibody than those which have been carried only in eggs but have a greatly increased sensitivity to nonspecific inhibitors.[14]

These considerations make it difficult to draw conclusions from data derived by HI or virus neutralization tests. Future studies utilizing complement-fixation,

TABLE 3.—*Comparative Hemagglutinin and Complement-Fixation Antigen Titers of Allantoic Fluids*

Virus Strain	Hemagglutinin Titer*	Complement-Fixation Antigen Titer†
A/Japan/305/57	100	128
A/FM1/47	800	16
A/Malaya/54	800	32
A/Ned/56	200	16
A/PR8/34	1,200	< 8

* Reciprocal of highest dilution giving positive pattern test with 0.5% suspension of chicken erythrocytes.

† Conventional tests using overnight incubation at 4 C and pooled serum from persons convalescent from A infections in March, 1957.

serum antibody absorption, or antibody-virus precipitation methods may demonstrate a closer antigenic relationship between the FE viruses and earlier type A strains.

It has been reported[15] that serum obtained from people in Holland in the age range 70-84 contained antibody against the FE strain. Rises in these antibody titers were found in this group after injection of type A vaccines prepared with strains isolated since 1933. This observation is of particular interest because it suggests that viruses prevalent during the pandemic of 1889 contained antigens shared with these most recent A strains, which would be similar to interrela-

tionships demonstrated with the Swine, PR8, and FM1 sets of strains.[16] Although serums taken from people of similar age groups in Alabama,[12] Washington, D. C.,[17] Michigan,[18] and Missouri [19] did not contain inhibiting antibody measurable with FE viruses, additional tests with comparable postvaccination serums and other lines of FE viruses are indicated. Studies of this nature are being continued.

Antigenic Potency

The evidence is firm that the production of antibody stimulated by injections of preparations containing killed influenza viruses is correlated with immunization against the disease.[3] Vaccine specifications have been on the basis of viral concentrations determined by chicken cell agglutination (CCA) activity. Early results of studies with the prototype strain A/Japan/305/57 by six vaccine manufacturers in the United States indicated that products containing more than 200 CCA units per milliliter would be difficult to obtain.[20] Results of studies by the commission on influenza, Armed Forces Epidemiological Board,[21] with previously isolated A viruses have made it clear that an antigenic mass represented by 750 to 1,000 CCA units was most effective. The lower specification of 200 units for military and civilian uses [22] is governed by the practical consideration of the yields obtained in experimental lots by vaccine manufacturers with the A/Japan/305/57 virus.

There is reason to believe at this time that considerably more antigen is contained in preparations of this strain than the CCA titer indicates. Chickens immunized with allantoic fluids which contain about 50 CCA units have responded by producing antibody measured by HI tests in titers as high as 1:800, which is in the range obtained with greater concentrations of immunizing fluids containing previously isolated A viruses.[23] When allantoic fluids were titrated by complement-fixation methods a much higher concentration of antigen was measured than with similar allantoic fluids from eggs infected with other type A viruses. Representative results of these tests are presented in table 3. It will be noted that, although the hemagglutinin titers were lower with A/Japan/305/57, the highest complement-fixation antigen concentrations were found with this strain. Failure of the PR8 strain antigen to fix complement with antibody in these serums indicates the degree of specificity which may be encountered when serums from young age groups are used. This is in keeping with previously recorded observations concerning age-specific antibody.[24] In view of these results and the other considerations, additional studies are under way to assess the value of complement-fixation titers as a means of indicating antigen concentration and potency of influenza vaccines.[25]

Several studies have been initiated to determine the minimal CCA dose of the A/Japan/305/57 strain necessary to elict antibody in groups of humans. At least three methods of virus concentration and vaccine manufacture are in use, and representative preparations have been made available by several pharmaceutical companies for these tests in adult civilian and military populations. Early results [26] have indicated that antibody production can be stimulated with this virus.

Serologic Diagnosis

The earliest tests [27] demonstrated that comparatively low antibody titers were found in serum from patients convalescent from infection with the FE viruses. This may be due to the behavior of these strains in HI tests or, more likely, to the nature of antibody response when a new antigen is encountered.[21] It is evident that serologic diagnosis can be made with both HI and complement-fixation test methods.[28] However, several cases not detectable when the Japan/305 virus was used in HI tests were found by complement-fixation tests with that virus in allantoic fluid or membrane extracts containing soluble antigen.[12] Previous experience has indicated that serologic diagnosis is more often made when both HI and complement-fixation tests are carried out rather than either one.[21]

Availability of Materials and Information

Diagnostic serums, antigens, and seed viruses have been sent to approximately 100 laboratories in the Americas which collaborate with the World Health Organization Influenza Program. Other interested laboratories are urged to join the network and offer their assistance. Any competent laboratory will be supplied materials and information concerning the laboratory aspects of influenza by the center upon request.

Dr. C. C. Dauer, in the National Office of Vital Statistics, Washington, conducts the Influenza Information Office for the WHO Influenza Program in the United States, and Dr. A. M.-M. Payne, in the WHO offices at Geneva, coordinates the world-wide program. Dr. Dauer publishes information in the weekly Morbidity and Mortality Reports and should be contacted concerning pertinent clinical and epidemiologic observations.

Summary

The influenza now occurring in sporadic cases or epidemics in many areas of the world is caused by viruses of type A. Results of antigenic analyses of several of these isolates have made it clear that vaccines should be modified to contain a representative of this new set of variants. Laboratory diagnosis can be established by serologic identification of agents isolated from throat washings and by complement fixation and hemagglutination-inhibition tests with paired serums from suspect cases. Diagnostic reagents including antigens and typing antiserums have been made available to state health officials and to many laboratories which are cooperating with the Influenza Program of the World Health Organization. Vaccine potency tests are in progress, and preliminary results are encouraging.

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INFLUENZA

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• *The situation with respect to Asian influenza is unique in that the causative virus has been isolated before the disease itself appeared in the United States. Intensive study of past experience makes it seem probable that this disease will continue to spread during the rest of the summer but will not be highly epidemic in the United States until fall or winter, when outbreaks are anticipated. Although it is impossible to make any firm predictions at this time, it is unlikely that the virulence of the infection, as manifested in case-mortality rates, will be higher in the later outbreaks. The present epidemic, with its rapidity of spread and high attack rate, is sufficiently unusual to press for immunization against the new virus. As a properly constituted vaccine is the only preventive, its use should be encouraged as soon as it becomes available.*

During recent weeks the eyes of the medical profession of the United States have been on the influenza epidemic which swept through the Far East. Thus far only sporadic outbreaks have occurred in this country, and have not in themselves offered a serious problem.

The important consideration, however, is what will happen during the fall and winter months. The distinct possibility of an influenza epidemic in the United States this coming winter cannot be ignored. Experts in the field say there is little question that we will have an epidemic in this country sometime during those months. In view of this, it seems appropriate to review the current situation, with some dwelling on the lessons learned from the past [1] so that we can be better prepared to meet any eventuality.

Historical Aspects

Outbreaks of influenza have attracted considerable attention from many outstanding physicians during centuries in which severe disease and high mortality were commonplace. The disease has been known through the ages under a variety of names—the jolly rant, gallants' disease, the fashionable illness, and more recently as the flu, or the virus—none of which carry a particularly ominous note.

Certain characteristics of the illness distinguished such occurrences from other contemporary disturbances of the day, among which were the sudden appearance and the widespread involvement of all ages and kinds of people.

The great similarity in many of the clinical descriptions is also evident. Of the extensive epidemic of 1557, T. Short relates, as quoted by Francis, "it began with a roughness of the jaws, small cough, then a strong fever, with a pain of the head, back and legs; some felt as though they were corded over the breast and had a weight at the stomach; all of which continued to the third day at the farthest; then the fever went off with a sweat, or bleeding at the nose. In some few, it turned to a pleurisy, or fatal peripneumony." [1] With limited variations this description is met again and again and remains virtually unchanged to the present day.

Another prominent characteristic of this illness which has been recorded since the time of the first real pandemic in 1580 is low mortality.[2] The single exception to this was in the pandemic of 1918, which will be discussed in further detail.

The first epidemic with origin in America was described in 1758. Again the high morbidity and low mortality feature was in evidence. Asia and Europe were hit with a pandemic in 1782. Many observers noted the tremendous incidence of the illness, with its peak in May in England, and, while the mortality was

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low, frequent complications were described. Herpes, erysipelas, sore throat, and pulmonary disease were mentioned repeatedly. Also pointed out at this time was a striking difference in attack rates at varying ages. Young children and older people were less often affected than the middle-aged group. More women than men were said to escape.

In the 19th and 20th centuries, recurrences were highlighted by the pandemics of 1890 and 1918. The pandemic of 1918-1919, which swept over nearly every continent and island of the globe, has been described as one of the great human catastrophes of all time.

Our interest in the happenings preceding the 1918-1919 holocaust are reawakened in view of the unusual features accompanying the current epidemic of Asian influenza. In January, 1916, influenza was reported to be epidemic in 22 states but was described as a mild type of illness.

As early as December, 1917, influenza was prevalent in Camp Kearny, California, and in other Army camps in January, 1918, but the disease was said to be mild. In the spring, localized outbreaks occurred in the civilian population of the United States and mortality from pneumonia rose sharply in certain cities. Mild epidemics of influenza were reported in various localities in Western Europe in April and May of 1918, and in June and July more extensive outbreaks occurred in Great Britain and in Europe, China, India, the Philippine Islands, and Brazil. In these countries, mortality rose moderately.

During August, 1918, epidemics of influenza were reported in Greece, Sweden, Switzerland, Spain, and the West Indies, and late in the month it appeared almost simultaneously in Camp Shelby, Mississippi, and Boston. In September, it appeared in rapid succession in other cities and Army camps along the eastern seaboard and the Gulf of Mexico and spread rapidly westward across the country. By October, the epidemic had involved the entire United States except for a few isolated areas. The interval between the peaks of the epidemic in Boston and in San Francisco was about four weeks, and the peaks in the number of deaths usually were reached within about one month after the beginning of the epidemic in a community or area. In some areas there was a recrudescence of the epidemic in January and February, 1919, which was most marked in the cities where the autumn epidemic was less severe. Thus the influenza epidemic of 1918-1919 was characterized by a relatively mild phase in the spring of 1918, an explosive outbreak with high mortality in the fall, and a third phase or recrudescence early in 1919.

One distinct characteristic of the 1918-1920 pandemic was the extraordinarily high mortality in young adults. The greatest amount of mortality in epidemics prior to and subsequent to 1918-1920 was found in children under 1 year of age and in persons aged 65 and over. About 90% of the men in military service in World War I were young adults between 20 and 35 years of age. Consequently, the armed forces were seriously affected, as were the same age groups in the civilian population. In the Army over a million men were hospitalized for influenza and pneumonia, and of these there were more than 44,000 deaths. There were some 5,000 deaths among Navy personnel.

It has been estimated that there were 20 million cases of influenza and pneumonia in the United States in 1918-1919, with approximately 850,000 deaths. The latter figure includes deaths reported in the military.

The excess in the death rates over the "expected" in 1918-1919 was 598, 92% of which was caused by influenza and pneumonia. In recent years mortality from all causes has not shown a marked rise during influenza epidemics, and deaths attributed to influenza and pneumonia have been increasingly fewer in number. The principal impact of influenza epidemics since 1940 has been an excess of deaths from causes other than influenza and pneumonia, such as heart disease and other chronic diseases. As expected these deaths occur in the older age groups.

Little is known of the true prevalence or incidence of influenza in recent years because reporting of individual cases is unreliable. The disease cannot be clinically differentiated from other types of upper respiratory infections which may also be occurring during an epidemic of influenza, and it is not practicable to obtain laboratory diagnosis of all suspect cases. Absenteeism rates in schools, industries, or other working groups may rise, but such indexes are more useful in alerting health officers to the possibility of an influenza epidemic than in providing figures on incidence.

The virus of human influenza was isolated by Smith, Andrewes, and Laidlaw in 1933 and 1934 after intranasal instillation of throat washings in ferrets. Since that time several strains and types of influenza virus have been isolated, and from materials from patients in 1932 and later years the predominant type of virus has been determined.

Obviously studies prior to 1933 were largely descriptive of the nature of the outbreaks, including explosiveness, extent of the epidemic in terms of death in excess of normal seasonal expectancy, cases reported to health officers or estimated from household surveys immediately following the epidemic, time covered by the outbreak, regions or states where the epidemic was first noted, and the time and direction of its spread.

Since 1948, the Influenza Study Program, which is sponsored by the World Health Organization, has maintained a system of reporting specific diagnoses of influenza in the United States, Canada, South America, and Europe. Information concerning the specific diagnosis of influenza from approximately 40 collaborating laboratories located in universities, hospitals, public health services, and military installations is sent to the Influenza Information Center in the National Office of Vital Statistics. This information in turn has been published in weekly reports and sent to interested individuals in this country and abroad.

Etiological Aspects

Three immunologically distinct types of influenza virus have been identified (A, B, and C) and within type A are some four serologically intersecting groups

of type A strains. These groups have also been referred to as sets or families. Each has been successively responsible for type A influenza for a period of years. Serologic evidence has been obtained that strains of the antigenic nature of the swine set may have caused pandemic influenza in 1917-1919, remained in circulation 5 to 10 years, and then vanished except in swine. Such viral isolations have made it possible to recognize the cyclic nature of certain strains of influenza virus as well as to chart the course of an epidemic.

In the United States during the period 1933-1943 combined clinical, epidemiologic, and microbiologic studies have revealed six definite epidemics of influenza A. In 1947 A-prime viruses completely replaced the earlier groups and the etiological agents of influenza A have been variants within the A-prime set during the last 10 years on a world-wide basis. In May of this year a new strain of A-prime virus now termed the Asian influenza A–virus was isolated and has been found to be responsible for the current epidemic.

Influenza B virus has been responsible for a number of epidemics, the first of which occurred in 1936, which recur at longer cycles than influenza A. In both 1936 and 1940 influenza B occurred early in the year and influenza A in the late months. Influenza C is described as a virus in search of a disease, despite serologic studies demonstrating it to be a widespread infection.

History has taught us that the same virus can be responsible for apparently sporadic, limited epidemic, or pandemic occurrences of influenza and that they may, in reality, represent stages in the development by the virus of epidemic properties during its adaptation to the human population. It is pointed out by the Commission on Influenza that, while the clinical and epidemiologic characteristics of epidemic prevalences may be quite similar, the problem of waves and recurrences is a complex one, involving viruses of different immunologic character. It seems that similar viruses have been responsible for the otherwise characteristic but unidentified experiences both before and after 1918. Interestingly enough, no particular bacterial agent has been a consistent, or even frequent, accompaniment of these viral outbreaks. The conclusion is, then, that influenza virus was the decisive factor of 1918, producing a severe primary damage to the respiratory epithelium and creating a medium in which various bacterial agents could become implanted and produce the multiform pictures which were actually observed.

Present Epidemic

The current epidemic of influenza was first reported in Hong Kong and Singapore during the latter half of April, 1957. Then, in rapid succession, epidemics occurred in Taiwan, the Philippines, the Malayan States, Japan, India, and other areas.

Army medical teams investigating the early epidemics noted that the isolated virus appeared unusual in laboratory tests and sent the virus to the United States for antigenic analyses. These analyses demonstrated that the virus is type A, but is antigenically different in the hemoagglutination inhibition test from any previously known type A strains. Animal antiserums prepared against type A strains did not inhibit or neutralize the new variant, and no protective antibody could be demonstrated in serums from human beings repeatedly vaccinated with previously prevalent type A virus. Information to date suggests that little protection against the new virus is gained by previous vaccination with existing influenza vaccine.

Laboratory confirmation of sporadic outbreaks of Asian influenza in both military and civilian populations has been received from several sections of the United States. Beginning June 2, a series of influenza outbreaks were reported among ships which had been berthed in Narragansett Bay, Newport, R. I. The means of introduction of the virus to this population could not be ascertained, and spread of the epidemic was erratic. Subsequently infections with Far East strain influenza virus have been reported in San Diego, Monterey, Davis, and San Francisco, Calif.; Cleveland; Lexington, Ky.; Valley Forge, Pa.; Salt Lake City; and Grinnell, Iowa.

An interesting example of how the virus has spread in the United States is illustrated in the appearance of illness in California early in June, apparently introduced from returning visitors from the Far East. From California the illness spread inland initially to Iowa, Montana, and Utah. Further seeding of the virus was accomplished in July by travelers originating in Iowa and California. The highest attack rates (70%) have occurred among recruits in the military services. The other large outbreaks reported in the United States have been predominantly in groups of young people living, or brought together, in environments that favor the spread of infection. To date there has been little variation in severity of the illness and but two deaths have been reported in the United States resulting from complications of influenza.

Clinical and Public Health Aspects

The experience in Asia and in the United States since the new type of virus was introduced provides no basis for predicting an increase in severity of infection in the coming fall and winter or during the next year or two. The present concern arises largely from the possibility that a more virulent variant of the Asian type may emerge. The severity of the 1918 influenza epidemic is believed to have been due to some such mutation which exposed the population to a virus or viruses with antigenic properties radically different from those strains to which they had been previously exposed.

Influenza is one of several acute infectious diseases involving the upper respiratory tract that may occur in epidemic form. Such infections as adenovirus (APC-ARD), exudative pharyngitis, the common cold, and others cannot be differentiated from influenza without appropriate confirmatory laboratory tests. An outbreak of influenza may occur simultaneously with one of the other respiratory infections. However, influenza usually spreads more widely and more rapidly and its presence may be suspected when an epidemic shows this characteristic.

Clinically influenza is usually characterized by abrupt onset, prostration, temperature as high as 104 F (40 C), headache, myalgia, cough, and sore throat. X-ray examinations of the chest usually show no abnormal findings. Leukopenia is common in uncomplicated cases. The febrile period usually lasts three to five days, following which the patient may complain of extreme weakness for several more days.

In laboratory diagnosis of individual cases, the virus may be isolated from secretions of the nose and throat taken early in the course of the illness. The procedure consists of inoculating chicken eggs which have been incubated for about 10 days and recovering the virus in the fluids of the embryonic sac.

Paired specimens of blood, one taken in the acute phase and the other 10 days to two weeks later, may be used for serologic tests. A fourfold or greater rise in antibody titer is regarded as an indication of influenza infection. Since neither of these laboratory procedures can be completed while the patient is still acutely ill, they are of little value to the physician in prescribing treatment. Such tests are necessary, however, to confirm the presence or absence of influenza in a community.

Even when considered mild in terms of fatality, influenza epidemics cannot be regarded as innocuous. Illnesses usually are prostrating for two or more days and are often followed by a period of lassitude and weakness. In an epidemic, medical care facilities may be temporarily overtaxed, attendance in school interrupted, and the entire economy disrupted by absenteeism in all types of industries, some of which are in critical areas.

Immunological Aspects

The isolation of specific types and strains of influenza virus has explained substantially what was formerly believed to be the brief immunity conferred by an attack and has also created critical problems in the development and production of effective immunizing agents. Type A was first isolated in 1933 and, in 1940, type B was discovered and found to have no serologic relationship to type A. Neither virus stimulates the production of antibodies against the other. Thus it became clear why some individuals had second attacks of influenza within a year or two. The later identification of variants of type A further clarified the question of repeated attacks, since some of these variants had quite different antigenic components. Serologic tests conducted in recent years indicate, however, that an attack of influenza confers a relatively long-lasting immunity to the specific virus involved, as well as to homologous or closely related strains. The introduction of new variants increases the possibility of repeated attacks.

Vaccines of high potency will stimulate the production of antibodies against strains of influenza virus that have been used in their manufacture, as well as against closely related strains. Even when antibodies cannot be detected by serologic tests of vaccinated persons there is reason to believe that such vaccines afford some protection against natural infections. When a variant appears whose antigenic structure is widely different from that of previously isolated viruses, a vaccine which has been satisfactory hitherto may be relatively ineffective against the new strain. This happened in 1947 when the A-prime influenza virus was identified. The same problem confronts manufacturers of vaccine today with the introduction of the new Asian virus. If a variant can be discovered and incorporated into vaccine shortly after it has emerged, the vaccine can often be used effectively in reducing the number and severity of illnesses caused by the new virus.

Influenza vaccines have been used most extensively in special population groups such as military personnel, schools, and certain employee groups. Studies in the military reveal that a properly constituted vaccine is 70% effective under epidemic or endemic conditions and that reactions to the vaccine are quite rare. Individuals known to be sensitive to egg are not given the vaccine, since virus is grown in embryonated eggs.

The manufacturers of vaccines have been able to produce a satisfactory monovalent vaccine containing the Asian strain. They are currently working to produce this vaccine on a large-scale basis.

Present Considerations

Thanks to alertness of epidemiologic and laboratory workers in the military, an isolation of the causative virus has been made prior to the appearance of influenza in the United States. The uniqueness of this situation is appreciated when we realize that for the first time in history we are in the fortunate position of being ahead of an impending epidemic of influenza.

On the basis of past experience it seems probable that influenza will continue to spread for the remainder of the summer months but will not be highly epidemic in the United States until fall or winter, when outbreaks may be anticipated. Although the disease will probably be mild, there is always the outside possibility of a repeat of the 1918 epidemic. There is a further possibility that the virulence of the infection as reflected in case-mortality rates will increase. Even though these are still only possibilities, any preparations which need to be made to meet these eventualities must be accomplished now. After a pandemic starts it will be too late.

The world-wide influenza study program under the auspices of WHO, which for the most part is mainly with the Public Health Service in the United States, has been functioning during the current alert and is being strengthened by a greater number of laboratories and observers both in this country and abroad.

At the invitation of WHO, a plan for investigation of influenza outbreaks in foreign countries has been developed by the Influenza Commission of the Armed Forces Epidemiologic Board. This operation will utilize personnel on the commission, certain investigators from universities, and members of the uniformed services. In this way more detailed field information can be obtained about these epidemics than is available from the usual sources. In particular the teams will be interested in determining (*a*) the properties

of the virus, (*b*) complete clinical descriptions, (*c*) whether a bacterial component is associated with the illness, and (*d*) epidemiologic aspects.

The American Medical Association has already announced a program designed to offset the severe strain placed on medical personnel when so many people suddenly become ill.

Finally, in recent years the nature of influenza in the United States has not warranted the use of influenza vaccine except on a group basis to minimize absenteeism or in so-called priority groups. However, the present influenza epidemic, with its rapidity of spread and high attack rate, is sufficiently unusual to press for immunization against the new strain of influenza virus. As a properly constituted vaccine is the only preventive for this disease, the Public Health Service with the Association of State and Territorial Health Officers and the American Medical Association plans to promote the use of the vaccine as soon as it becomes available. To accomplish this we plan to embark upon an educational and promotional campaign to encourage all persons who want it to seek influenza vaccine on a voluntary basis. Any such campaign must be conducted in an orderly fashion to avoid confusion and hysteria in the public and will call for the combined efforts of all of us.

Summary

Influenza has been known for centuries under a variety of names, but, except for the pandemic of 1918, the illness was regarded lightly. For the past 25 years it has been possible to incriminate certain strains of type A virus and type B virus as causative agents of cyclic outbreaks of influenza.

The current epidemic in the Far East and the sporadic outbreaks in the United States and elsewhere are caused by a new strain of type A virus popularly known as the Asian strain. There is a distinct probability that the current influenza epidemic will increase and develop into pandemic porportions by late fall or winter. Also there lurks the possibility of an increase in virulence of the infection as reflected in case-mortality rates. A properly constituted vaccine containing the new strain of type A virus represents the only preventive tool at our command.

Influenza vaccines have been proved effective and safe in controlled studies conducted by the military. The Public Health Service, in cooperation with the State and Territorial Health Officers and the American Medical Association, will stimulate and promote a nationwide voluntary program of vaccination against the prevalent strain of influenza.

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CLINICAL NOTES

ON PERIPHERAL THROMBOPHLEBITIS

ITS OCCURRENCE AS A PRESENTING SYMPTOM IN MALIGNANT DISEASE OF PANCREAS, BILIARY TRACT, OR DUODENUM

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and
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Trousseau,[1] in 1856, noted that thrombosis of peripheral veins may be the first clinical indication of the presence of a malignant tumor in some part of the body. This observation has had such recent confirmation as the study of Woolling and Shick.[2] They reported 15 cases of carcinoma that had been unrecognized until after the patients sought medical aid because of symptoms referable to thrombophlebitis. The association of venous thrombosis and carcinoma of the pancreas was carefully investigated in autopsy material by Sproul,[3] who found thrombosis of one or more veins in 14 of 47 patients with carcinoma of the pancreas and in 9 of the 16 patients with carcinoma restricted to the body or tail—a very high incidence.

Generations of medical students have been taught, on the basis of these and similar studies, that peripheral thrombophlebitis as a presenting complaint is suggestive of malignant disease in organs of the upper abdomen, particularly the pancreas. We, on the other hand, have been impressed with the infrequent clinical association of the two diseases (as opposed to findings at autopsy). To test our clinical impression, we reviewed the case histories in a personal series (S.O.H.) of 100 consecutive patients who had carcinoma. The site was the head of the pancreas in 38 cases, the body and tail of the pancreas in 21 cases, the ampulla of Vater in 13, the common bile duct in 13, the gallbladder in 9, and the duodenum in 6.

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In the 100 case histories, we found only one case of peripheral thrombophlebitis; it was the presenting symptom in a patient who had carcinoma of the head of the pancreas. One case of thrombosis of the hepatic veins in association with carcinoma of the tail of the pancreas was found at autopsy. The only other case suggesting previous venous difficulty was that of a patient who had carcinoma of the body of the pancreas and who had had stasis dermatitis of the legs (present for years) recorded as an incidental finding.

After determining this low incidence of thrombophlebitis, we reviewed 46 cases in which the primary diagnosis was peripheral thrombophlebitis. They were random case records obtained from the record room, not a consecutive series, and, as such, are subject to the limitations of all nonconsecutive series. One case record from the personal series already mentioned was included; the patient had carcinoma of the head of the pancreas. Carcinoma or other malignant disease was disclosed in 7 (15%) of the 46 cases. In these seven, the site of the malignancy was the prostate in two cases, the lung in one, the liver (primary) in one, and the pancreas (our case) in one. There was one case of lymphosarcomatosis and one of chronic lymphatic leukemia.

In our consecutive series of 100 cases of biliary, pancreatic, and duodenal carcinoma, the low incidence (2%) of thrombophlebitis possibly could be related in some obscure fashion to the type of patient who receives treatment at a private clinic. Or it may represent a true index of the frequency with which the conditions are associated, as seen by the clinician. On the other hand, an incidence of 15% (7 of 46 patients) of malignant disease in some part of the body in patients whose presenting symptom is thrombophlebitis reaffirms the original observation of Trousseau.

Comment

Patients with carcinoma of the pancreas, gallbladder, bile duct, or duodenum, as seen by the clinician, do not have a high incidence of peripheral thrombophlebitis, but patients with spontaneous thrombophlebitis do have a significant incidence of malignant disease.

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HIGH ACID PHOSPHATASE LEVEL INDICATING GAUCHER'S DISEASE IN PATIENT WITH PROSTATISM

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While no laboratory test is pathognomonic of a single disease, the one regarded as most nearly approaching this aim is the determination of the serum acid phosphatase level. Since the work of Gutman and Gutman,[1] a pronounced elevation of the serum acid phosphatase level has been considered indicative of metastasizing carcinoma of the prostate. One of us and co-workers[2] have pointed out that the serum acid phosphatase level is elevated in Gaucher's disease (lipid histiocytosis of kerasin type) and described eight patients with values ranging from 4.0 to 11.7 units per 100 cc., of whom seven had values of 7 units or over. Elevation in one case of Niemann-Pick disease (lipid histiocytosis of phosphatide type) has been described in the Scandinavian literature.[3]

The following case of a 68-year-old man seen by one of us (M. S.) for classic symptoms of prostatism is reported. The finding of a serum acid phosphatase value of 10.3 Gutman units per 100 cc. led to the presumptive diagnosis of carcinoma of the prostate with metastases. When the clinical findings, the results of punch biopsy, and the improvement of the symptoms made the diagnosis untenable, the recent finding of one of us (L. R. T.), Suna, and Carr was recalled.[2] A sternal marrow aspiration was done, and the diagnosis of asymptomatic Gaucher's disease, which was hitherto unsuspected, was made.

From the departments of medicine and urology, the Mount Sinai Hospital.

Report of a Case

A 68-year-old man was admitted to the urologic service of Dr. G. D. Oppenheimer at the Mount Sinai Hospital, New York, with a chief complaint of dysuria and nocturia of two months' duration. He had always been well until one year previously, when he had a brief episode of dysuria. Two months before admission, he began to experience dysuria and nocturia that reached the frequency of three times nightly. One of us (M. S.) saw the patient in his office and had the patient hospitalized for study because acid phosphatase determinations gave successively levels of 7.0 and 10.3 Gutman units.

Physical examination showed the patient to be a vigorous, healthy-appearing man of 68 years of age, who was only slightly disturbed by his physical complaints. Except for incipient cataract formation and mild senile emphysema, no abnormalities were found on general physical examination. His blood pressure level was 130/60 mm. Hg, his chest was clear on fluoroscopy, and the heart sounds were normal. No masses were felt in the abdomen. The prostate was enlarged to about twice its normal size, but it felt smooth, no nodules being palpated.

The laboratory findings included urine with a specific gravity of 1.016 and no albumin or sugar and two to seven red blood cells per high-power field. The hemoglobin level was found to be 12.6 Gm. per 100 cc., and the white blood cell count was 5,400 per cubic millimeter, with 76% polymorphonuclear cells,

18% lymphocytes, 1% eosinophils, 1% basophils, and 4% monocytes. The sedimentation rate was 31 mm. per hour (Westergren). Sulfobromophthalein (Bromsulphalein) determination showed 2% retention at the end of 45 minutes, the urea nitrogen level was 14 mg. per 100 cc., and the sugar level in the fasting state was 107 mg. per 100 cc. The serum total protein level was 8 Gm. per 100 cc., with 4.6 Gm. albumin and 3.4 Gm. globulin. The result of the cephalin flocculation test was 2+. The cholesterol ester partition was 204/162 mg. per 100 cc. Two additional determinations of serum acid phosphatase with the phenyl phosphate substrate showed values of 7.4 and 7.4 units per 100 cc. Alkaline phosphatase values were 7.2 and 8.1 King-Armstrong units per 100 cc., which precluded the explanation of the elevated acid phosphatase values as being due to nonspecific spillover.

A cystogram showed a normal-sized bladder with the floor slightly elevated, and an intravenous pyelogram showed normal urinary tracts bilaterally. X-ray examination of the skull, the thoracic and lumbosacral spine, pelvis, ribs, and the long bones of the upper and lower extremities showed no evidence of discrete, cystic, or blastic lesions.

On the patient's admission, the majority opinion on the urologic service was that carcinoma of the prostate was the most probable diagnosis, this opinion being based upon the age of the patient, the symptoms of prostatism, and the elevated serum acid phosphatase levels. The prostate, however, was smooth and no nodules were felt; therefore, a perineal biopsy was performed. The tissue obtained was reported as showing fragments of prostatic tissue without significant change and no definite evidence of tumor. After a postbiopsy urinary retention, the patient's symptoms of prostatism abated completely. At this point, while other members of the service puzzled over its significance, Dr. S. A. Averbuck and one of us (M. S.) independently suggested that the elevated serum acid phosphatase levels might be due to Gaucher's disease. The hematological consultant did not agree with the idea, but, after a palpable liver and spleen were demonstrated, he agreed to do a sternal marrow aspiration. The aspirate was reported as being a somewhat dilute marrow showing megakaryocytes in adequate numbers and Gaucher cells on the smear.

Comment

It is probable that the diagnosis of Gaucher's disease would never have been thought of, in this vigorous, well man who had lived a long life with no significant disability and whose hepatosplenomegaly was so minimal that it was only established after the diagnosis of Gaucher's disease was considered, had it not been for the failure to explain the elevation of the serum acid phosphatase level on the basis of carcinoma of the prostate with metastasis. This certainly seemed the reasonable and probable explanation when the patient was first seen, but the complete subsidence of prostatic symptoms, the negative findings on perineal biopsy, and the well-being of the patient, failed to substantiate this opinion. Without the sternal marrow biopsy, the case would have remained an enigma. The patient could have had a prostatectomy, which would have shown a benign prostatic adenoma, or he would have been watched. In either instance, there would have been no explanation for the elevated serum acid phosphatase level. It is noteworthy that an extensive x-ray survey of the bones was negative and that no evidence of liver disease was present.

An earlier paper by one of us and associates[2] includes the report of the case of a 74-year-old physician, known to have had Gaucher's disease for many years, in whom a serum acid phosphatase level of 8.3 units per 100 cc. remained unexplained when the findings at operation and the pathological report revealed a benign prostatic adenoma.

Summary

A 68-year-old man was suspected of having carcinoma of the prostate because of prostatism and an elevated serum acid phosphatase level. The diagnosis, hitherto unsuspected, of Gaucher's disease (lipid histocytosis of kerasin type) was established by sternal marrow biopsy.

71 E. 77th St. (21) (Dr. Tuchman).

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Pain in Shoulder, Arm, or over the Chest.—Osteoarthritis is a common cause of irritation of nerve roots. In 1925, Parker and Adson provided one of the earliest descriptions of encroachment by hypertrophic spurs on the spinal foramina, causing irritation of the nerve roots, with symptoms referred to the region of distribution of some of the efferent portions of the particular nerves. Bony changes frequently occur in osteoarthritis of the cervical segment of the spinal column. These changes are found most often in the lower cervical vertebrae from which emerge the sixth, seventh and eighth cervical nerves. It is well to recall that these segments contain a portion of fibers which supply the pectoralis major and minor, the subscapularis and the deeper portion of the latissimus dorsi muscles. If the foramina from which these nerves emerge are narrowed, it can readily be understood how a patient could have a pain over the pectoral region or the region of the shoulder and arm. Occasionally, a patient will have osteoarthritis of the cervical portion of the spinal column and complain of a dull ache largely confined to the region of a shoulder and arm. The patient may not complain of pain in the neck but he may have noticed that certain movements of the neck, such as hyperextension, will produce pain in the region of the shoulder, arm or chest. However, when a patient complains of pain in the shoulder, in the arm or over the chest, it is well to keep in mind the fact that this pain may be due to osteoarthritis of the cervical vertebra.—D. J. Erickson, M.D., Cervical Traction and Other Physical Therapeutic Procedures for Pain About the Neck and Shoulders, *Minnesota Medicine*, June, 1956.

COMMITTEE ON MEDICOLEGAL PROBLEMS

MEDICOLEGAL APPLICATIONS OF BLOOD-GROUPING TESTS

Last year the Committee on Medicolegal Problems published a tentative supplementary report discussing the medicolegal applications of blood-grouping tests (J. A. M. A. 161:233-239 *[May 19] 1956*). *Because a portion of the report was controversial, comments were solicited from workers in the field. These comments have been received and analyzed, and below is the revised and final version of the report of the Committee on Medicolegal Problems, American Medical Association, prepared by a subcommittee consisting of Alexander S. Wiener, M.D., Brooklyn, N. Y.; Ray D. Owen, Ph.D., Pasadena, Calif.; Clyde Stormont, Ph.D., Davis, Calif.; and Irving B. Wexler, M.D., Brooklyn, N. Y.*—Ed.

In 1952, a report [1] was prepared by the Committee on Medicolegal Problems of the American Medical Association describing the status at that time of the medicolegal application of blood-grouping tests for the exclusion of parentage and for the examination of stains of blood and secretions. The purpose of this supplementary report is to review further developments in the field during the period 1952-1957.

Blood Group Nomenclature

One of the most pressing problems at the present time is that of blood group nomenclature. This pertains particularly to the important Rh-Hr types, for which two principal methods of designation are in use, namely, the original Rh-Hr nomenclature and the C-D-E symbols. The submission to jurists by different experts of medicolegal reports with conflicting symbolisms cannot help but confuse them and shake their confidence in the blood tests. Moreover, reports in two different symbolisms require translation from one into the other when comparisons are to be made; there is always danger of error in this process. Therefore, the adoption of one uniform nomenclature for medicolegal reports is most desirable.

Marked disagreement is prevalent among workers in the field, and while the Committee is prepared to make a firm and unqualified recommendation, a survey of contrary opinion has been prepared and can be found in the section "Contrary Opinion on Nomenclature." Although corresponding to the two systems of designating the Rh-Hr types there are two conflicting genetic theories, the crux of the problem is actually on a serologic level. It is most important to distinguish clearly between agglutinogens and their serologic attributes, the blood factors.[2] An agglutinogen may be defined as a substance present on the surface of the red blood cells that is differentiated by certain agglutination reactions with diagnostic reagents. The blood factors, on the other hand, are those attributes of the agglutinogen molecule (perhaps an arrangement of polar groups, electric charges, and other configurational details on the surface of the molecule) that enable it to combine with antibodies. In general, each agglutinogen is characterized by multiple blood factors. The C-D-E notations for the Rh-Hr types make no allowance for the difference between a blood factor and an agglutinogen and incorporate the tacit, incorrect assumption that every agglutinogen has but a single corresponding antibody. This has led to a number of paradoxes, which have been described in detail elsewhere [3] and need not be elaborated here. Indeed, much of the evidence that has accumulated regarding the serology and genetics of the Rh-Hr types refutes the interpretation implicit in the C-D-E notations. On the other hand, the original Rh-Hr nomenclature presents the data objectively, without committing the user to a preconceived interpretation, which at times may be inconsistent with the actual observations. Under these circumstances, the Committee has been obliged to adopt the original Rh-Hr nomenclature as the sole nomenclature in the preparation of this report. This committee, therefore, recommends that the C-D-E notations for the Rh-Hr types be discarded and that, in approved medicolegal reports, unless and until some other convention is agreed upon, the original Rh-Hr nomenclature be retained as the sole nomenclature for this blood group system (table 1).

In any blood group system, and the Rh-Hr system in particular, one must carefully distinguish among agglutinogens, blood factors, and genes. To avoid confusion among these three levels, appropriate provisions must be made in the symbols. Therefore, it is suggested that regular-face type be used for agglutinogens and phenotypes, boldface type for blood factors and their corresponding antibodies, and italic type for genes and genotypes. This is in keeping with accepted genetic usage. This recommendation is approved by this committee and has been adopted for the purpose of this report. For purposes of illustration and for its practical value, the heredity of the Rh-Hr types will be briefly reviewed, using the recommended nomenclature.

At the present time, four principal Rh blood factors (**Rh$_0$**, **rh′**, **rh″**, and **rh^y**) and three principal Hr factors (**hr′**, **hr″**, and **hr**) are recognized. However, antiserums for only four of these seven factors are readily available for routine clinical and medicolegal work, namely, anti-**Rh$_0$**, anti-**rh′**, anti-**rh″**, and anti-**hr′**. Therefore, this discussion will be confined to the results obtained using these four antiserums. (Some workers also routinely carry out tests with anti-**hr″** serum.) Ample evidence is now available that there are eight principal alleles determining the heredity of the Rh-Hr types, as distinguished by these four reagents. Table 2 lists these alleles and their corresponding agglutinogens, as well as the blood factors that characterize each agglutinogen. Table 3 gives the various reactions that

may be encountered in actual tests carried out with the four Rh-Hr antiserums. It will be seen that there are 12 possible phenotypes, to which there correspond 36 theoretically possible genotypes. With these basic data, it is simple to determine which Rh-Hr types can occur and which cannot for any given mating.

and table 4 was drawn up after examining the similar table prepared by Boyd. It will be noticed that the phenotypes have been numbered, but these numbers are not intended to be used as a new nomenclature for the Rh-Hr types. The phenotype numbers are used merely for compactness in presenting the table, and

TABLE 1.—*Rh-Hr Phenotypes and Genotypes*

2 Rh Phenotypes			12 Rh Phenotypes					28 Rh-Hr Phenotypes					
					Reaction with					Reaction with			
Designations	Approximate Frequencies in New York City Whites, %	Reaction with Anti-Rh_o (or Anti-rhesus)	Designation*	Approximate Frequencies in New York City Whites, %†	Anti-rh'	Anti-rh''	Anti-rh^y	Designation	Approximate Frequencies in New York City Whites, %‡	Anti-hr'	Anti-hr''	Anti-hr	55 Genotypes§
Rh negative	15	—	rh	14.4	—	—	—	rh	14.4	+	+	+	rr
			rh′	0.46	+	—	—	rh′rh	0.46	+	+	+	rr'
								rh′rh′	0.0036	—	+	—	$r'r'$
			rh^y	0.004	+	—	+	rh^{y}rh	0.004	+	+	+	rr^y
								rh^{y}rh′	0.00003	—	+	—	$r'r^y$ or $r'r^yr^y$
			rh″	0.38	—	+	—	rh″rh	0.38	+	+	+	rr''
								rh″rh″	0.0025	+	—	—	$r''r''$
								rh′rh″	0.006	+	+	—	$r'r''$
			rh$_y$	0.01	+	+	—	rh$_y$rh	0.008	+	+	+	rr_y
								rh$_y$rh′	0.0001	—	+	—	rr_yr'
								rh$_y$rh″	0.0001	+	—	—	rr_yr''
								rh$_y$rh$_y$	0.00001	—	—	—	rr_yr_y
			rh$_y$^{y}	0.00005	+	+	+	rh^{y}rh″	0.00005	+	+	—	$r''r^y$
								rh$_y$^{y}rh′	0.00001	—	+	—	$r'r_yr^y$
Rh positive	85	+	Rh$_o$	2.1	—	—	—	Rh$_o$	2.1	+	+	+	R^oR^o or R^or_y
			Rh$_1$	50.7	+	—	—	Rh$_1$rh	33.4	+	+	+	R^1r, R^1R^o, or R^1r'
								Rh$_1$Rh$_1$	17.3	—	+	—	R^1R^1 or R^1r''
			Rh$_1$^{y}	3.3	+	—	+	Rh$_1$^{y}rh	1.6	+	+	+	R^1r^y, $R^1{}^yR^o$, or $R^1r'^y$
								Rh$_1$^{y}Rh$_1$	1.7	—	+	—	$R^1{}^yR^1$, $R^1r''^y$, $R^1{}^yr'_y$, $R^1{}^yR^{1y}$, or $R^1{}^yr'^y$
			Rh$_2$	14.8	—	+	—	Rh$_2$rh	12.2	+	+	+	R^2r, R^2R^o, or R^2r'
								Rh$_2$Rh$_2$	2.4	+	—	—	R^2R^2 or R^2r''
			Rh$_3$	13.4	+	+	—	Rh$_1$Rh$_2$	12.9	+	+	—	R^1R^2, R^1r'', or R^2r'
								Rh$_2$rh	0.5	+	+	+	R^2r, R^1R^o, or R^2r^y
								Rh$_2$Rh$_1$	0.5	—	+	—	R^2R^1, R^2r', or R^1r^y
								Rh$_2$Rh$_2$	0.07	+	—	—	R^2R^2, R^2r'', or R^2r^y
								Rh$_2$Rh$_2$	0.0004	—	—	—	R^2R^2 or R^2r^y
			Rh$_3$^{y}	0.6	+	+	+	Rh$_1$^{y}Rh$_2$	0.6	+	+	—	$R^{1y}R^2$, $R^{1y}r''$, or $R^2r'^y$
								Rh$_2$^{y}Rh$_1$	0.008	—	+	—	$R^{1y}R^2$, $R^{1y}r^y$, or $R^2r'^y$

* In this table Rh_1 is used as a short designation for Rh_o', Rh_2 is short for Rh_o'', rh_y is short for rh'^y, and Rh_3 is short for $Rh_3'^y$.

† The reduction in the frequency of type rh′ as compared with that given in earlier charts can be attributed to recognition of bloods of type Rh_1 (containing Rh_o variant), which are now included in type Rh_1 instead of rh′. The agglutinogens Rh_o, Rh_1, and Rh_2 and their corresponding genes R^o, R^1 and R^2 are not given here because this would serve unnecessarily to complicate the chart, by increasing the number of possible genotypes to 91. Also, no attempt is made to include certain rare exceptional bloods, such as those lacking both factors **rh′** and/or lacking both **rh″** and **hr″**.

‡ Based on the estimated gene frequencies, $r = 0.38$, $r' = 0.006$, $r'' = 0.005$, $r^y = 0.0001$, $r'^y = 0.00005$, $R^o = 0.027$, $R^1 = 0.41$, $R^2 = 0.15$, $R^y = 0.002$, and $R^{1y} = 0.02$.

§ This table does not include hypothetical genes R^{1y} and r^yr^y, which must be extremely rare.

Taking into account the 12 possible phenotypes, there are 78 matings to be considered. (When the reactions of anti-**hr″** serums are taken into account, the number of phenotypes is increased to 18 and the number of matings to 171. A table listing these 171 matings has been published by Wiener.[4]) A table listing the 78 matings would require more than two pages. Boyd[3] has devised a compact method of presenting the various matings in the form of a "12 by 12" table, the key to the numbers is given at the top and side of the chart. For example, in the mating $Rh_2 \times Rh_2$ phenotype numbers **2**, **3**, **5**, **6**, **8**, **9**, **11**, and **12** appear in the box, which means that parents both of type Rh_2 cannot have children of types rh′rh, rh′rh′, rh′rh″, rh_yrh', Rh_1rh, Rh_1Rh_1, Rh_1Rh_2, or Rh_2Rh_1. This is readily verified with the aid of tables 2 and 3, since both parents of type Rh_2 can be carriers of genes R^2, R^o, r'', or r, and not of genes R^1, R^y, r', or r^y, so that all children with phenotypes in which one or more of the latter four genes must be present are excluded. The numbers in boldface type indicate phenotypes that, if present in the child, exclude maternity. Thus, a type Rh_2 mother cannot have a child of type rh′rh′, rh_yrh', Rh_1Rh_1, or Rh_yRh_1.

TABLE 2.—*Eight "Standard" Allelic Genes and Their Corresponding Agglutinogens*

Genes	Corresponding Agglutinogens	Blood Factors Characteristic of Each Agglutinogen*
r	rh	**hr′**
r'	rh′	**rh′**
r''	rh″	rh″ and **hr′**
r^y	rh_y	rh_y and **rh″**
R^o	Rh_o	Rh_o and **hr′**
R^1	Rh_1	Rh_o and **rh′**
R^2	Rh_2	**Rh_o**, **rh″**, and **hr′**
R^y	Rh_y	**Rh_o**, **rh′**, and **rh″**

* Taking into account only reactions with serums anti-Rh_o, anti-**rh′**, anti-**rh″**, and anti-**hr′**.

Contrary Opinion on Nomenclature

The tentative report, upon which the present report is based, called attention to the diversity of opinion that exists with reference to problems of blood group nomenclature, and in an accompanying editorial the hope was expressed that "workers in the field will submit their views on matters of nomenclature to the

Committee on Medicolegal Problems within the next few months, so that they can be considered in the preparation of the final report." In the tentative report, the Committee found itself unable to define a position compatible with all of the diverse opinions in this field and chose a stand that according to its own lights was sound. It is desirable to include in this final report a summary of contrary opinion as it appeared in the replies to the call for comments on the tentative report.

TABLE 3.—*Rh-Hr Phenotypes and Corresponding Genotypes*

Phenotype	Reactions with Serums: Anti-Rho	Anti-rh′	Anti-rh″	Anti-hr″	Corresponding Genotypes
rh	—	—	—	+	*rr*
rh′rh	—	+	—	+	*rr′*
rh′rh″	—	+	+	+	*r′r″*
rh″	—	—	+	+	*r″r″* and *r″r*
rh′rh″	—	+	+	+	*r′r″*, *rr″*, and *rr′r″*
rh₀rh′	—	+	+	—	*rr′* and *rr′r*
Rh₀	+	—	—	+	*R⁰R⁰* and *R⁰r*
Rh₀rh	+	+	—	+	*R⁰r*, *R⁰R*, and *R⁰r′*
Rh₀Rh₀	+	+	—	—	*R⁰R⁰* and *R⁰r′*
Rh₀	+	—	+	+	*R⁰R′*, *R⁰r″*, *R⁰r*, *R⁰R″*, and *R⁰r″*
Rh₀Rh₀	+	+	+	+	*R⁰R′*, *R⁰r″*, *R⁰r′*, *R⁰R″*, *R⁰R′*, *R⁰r″*, and *R⁰r*
Rh₀Rh₀	+	+	+	—	*R⁰r′*, *R⁰r″*, *R′R″*, *R′R′*, and *R⁰r*

Forty-nine letters were received, of which 43 expressed classifiable opinion on Rh-Hr nomenclature. Twenty-one of these were opposed to the recommendation on nomenclature and, for the most part, appeared instead to favor the exclusive adoption of the C-D-E-F system. Seventeen were in express agreement with the recommendation that "in medicolegal reports, unless and until some other convention is agreed upon, the original Rh-Hr nomenclature be retained as the sole nomenclature for this blood group system." Five others would retain both the Rh-Hr and C-D-E-F nomenclature. The communications received therefore suggest an approximately equal division of opinion on nomenclature.

In order to present properly the criticisms received regarding the report, it is necessary first to review the points on which the Committee bases the position it adopted. These were as follows: 1. There is need for a uniform nomenclature in medicolegal practice. 2. The C-D-E-F notation is undesirable because it is based on principles in conflict with established serology. 3. The Rh-Hr nomenclature is based on rational serologic and genetic grounds. It was suggested, therefore, that unless and until some better nomenclature is developed, it would be well to adopt the Rh-Hr nomenclature for exclusive use in medicolegal practice. In the present section of this report an effort will be made to present a synopsis of the views of those who opposed this suggestion. The Committee does not identify itself with these assertions.

With the eventual desirability of a uniform nomenclature there appears to be no serious quarrel. The question has been raised, however, of whether a proper choice can be made at this time, and several correspondents find it particularly repugnant that a decision should be made by a four-member subcommittee that is not representative of the full spectrum of opinion in the field. The tentative report did not attempt to document its position on points 2 and 3 of the outline of the argument presented above, though references were cited, and the correspondence accordingly did not provide a basis for debate on these issues. There were, however, several expressions of doubt that the facts presently available compel a decision in favor of the principles, either serologic or genetic, upon which the Rh-Hr nomenclature is based. Furthermore, in several instances, opinion was expressed to the effect that correctness in principle is not a proper issue in this matter; either of the available systems of nomenclature may be used to represent a test situation regardless of the genetic and serologic bases conceived for the situation. In fact, it was pointed out that the present inclination to consider the C-D-E-F symbols as reflecting "completely linked genes" is operationally indistinguishable, on genetic grounds, from the Rh-Hr postulate of multiple allelism. Differences on the serologic level were not discussed, but it was asserted that many immunologists do not recognize distinctions among agglutinogens, blood factors, and genes.

TABLE 4.—*Exclusion of*

Phenotype of Putative Mother	Phenotype of Putative Father: 1 rh	2 rh′rh	3 rh′rh′	4 rh″	5 rh′rh″
1. rh	**2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12**	**3, 4, 5, 6, 7, 8, 9, 10, 11, 12**	**1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12**	**2, 3, 5, 6, 7, 8, 9, 10, 11, 12**	**3, 6, 7, 8, 9, 10, 11, 12**
2. rh′rh	3, 4, 5, 6, 7, 8, 9, 10, 11, 12	4, 5, 6, 7, 8, 9, 10, 11, 12	1, 4, 5, 6, 7, 8, 9, 10, 11, 12	3, 6, 7, 8, 9, 10, 11, 12	7, 8, 9, 10, 11, 12
3. rh′rh′	**1, 3, 4,** 5, 6, 7, 8, 9, **10,** 11, 12	**1,** 4, 5, 6, 7, 8, 9, **10,** 11, 12	**1,** 2, **4,** 5, 6, **7,** 8, 9, **10,** 11, 12	**1,** 3, 4, 6, **7,** 8, 9, **10,** 11, 12	**1, 4, 7,** 8, 9, **10,** 11, 12
4. rh″	**2, 3,** 5, **6,** 7, 8, 9, 10, 11, **12**	**3, 6,** 7, 8, 9, 10, 11, **12**	**1, 3,** 4, **6,** 7, 8, 9, 10, 11, **12**	**2, 3,** 5, **6,** 7, 8, 9, 10, 11, **12**	**3, 6,** 7, 8, 9, 10, 11, **12**
5. rh′rh″	3, 6, 7, 8, 9, 10, 11, 12	7, 8, 9, 10, 11, 12	1, 4, 7, 8, 9, 10, 11, 12	3, 6, 7, 8, 9, 10, 11, 12	7, 8, 9, 10, 11, 12
6. rh₀rh′	**1,** 3, 4, 6, 7, 8, 9, **10,** 11, 12	**1, 4,** 7, 8, 9, **10,** 11, 12	**1,** 2, **4,** 5, 7, 8, 9, **10,** 11, 12	**1,** 3, 4, 6, 7, 8, 9, **10,** 11, 12	**1, 4, 7,** 8, 9, **10,** 11, 12
7. Rh₀	**2, 3, 1,** 5, **6,** 8, 9, 10, 11, **12**	**3** 4, 5, **6,** 9, 10, 11, **12**	**1, 3,** 4, 5, **6,** 7, 9, 10, 11, **12**	2, 3, 5, **6,** 8, 9, 11, **12**	**3, 6,** 9, **12**
8. Rh₀rh	3, 4, 5, 6, 9, 10, 11, 12	4, 5, 6, 10, 11, 12	1, 4, 5, 6, 7, 10, 11, 12	3, 6, 9, 12	None
9. Rh₀Rh₀	**1,** 3, **4,** 5, 6, 7, 9, **10,** 11, 12	**1,** 4, 5, 6, 7, **10,** 11, 12	**1,** 2, **4,** 5, 6, 7, 8, **10,** 11, 12	**1,** 3, 4, 6, 7, 9, **10,** 12	**1, 4, 7, 10**
10. Rh₂	**2,** 3, 5, **6,** 8, 9, 11, **12**	**3, 6,** 9, **12**	**1,** 3, 4, **6,** 7, 9, 10, **12**	2, 3, 5, **6,** 8, 9, 11, **12**	**3, 6, 9, 12**
11. Rh₀Rh₂	3, 6, 9, 12	None	1, 4, 7, 10	3, 6, 9, 12	None
12. Rh₀Rh₁	**1,** 3, **4,** 6, **7,** 9, **10,** 12	**1, 4,** 7, **10**	**1,** 2, **4,** 5, **7,** 8, **10,** 11	**1,** 3, 4, 6, 7, 9, **10,** 12	**1, 4, 7, 10**

* To understand and use this chart quickly and easily, the phenotype names and numbers should be used in conjunction with the table of Rh-Hr reactions (table 3). 1. Determine the phenotypes of the blood of the mother, putative father, and the child or children using potent and specific anti-Rho, anti-rh′, anti-rh″, and anti-hr″ serums, including appropriate controls. 2. Assign the corresponding phenotype symbol and number to each individual tested. 3. Find the assigned number of the mother and father on the side and top columns of the table and locate the box at which both intersect. 4. The child or children are not possible from this mating if their assigned numbers appear in this box. 5. Phenotype numbers given in boldface represent children for whom maternity

The most forcefully expressed contrary opinion, however, had to do with the question of usage and convenience. Several correspondents, particularly from Britain and Europe, asserted that the C-D-E-F system or some modification of it is in exclusive use there and attested to its clarity and adequacy. In America too, this system appears to have been adopted by teachers in at least two medical schools and a state of confusion is anticipated if in medical reporting a "return" to the Rh-Hr nomenclature, which is unfamiliar to the graduates of these schools, is advocated. The grounds for adopting the C-D-E-F rather than the Rh-Hr system in teaching are frankly expedient ones; it was repeatedly asserted that students do not comprehend test situations or communicate in terms of symbols involving primes, subscripts, bold-face, Roman, italic, and German script. Correspondents who testified to the difficulty of teaching or communicating in such terms included several who believe that the Rh-Hr conceptual basis of multiple allelic control of related antigens might be more sound than the "one gene–one antigen–one antibody–one symbol" basis of the C-D-E-F system.

Finally, other correspondents expressed the hope that a new system of nomenclature might appear that would command a clear majority of scientific support and usage. No strong opinions were expressed as to what this nomenclature should be like, although there were a few tentative suggestions. In the interval, however, it was urged that the adoption of a uniform nomenclature should await decision by a more representative body than the present committee, after more extensive and intensive consideration than has yet been given this difficult subject.

Use of Newer Blood Factors in Cases of Disputed Parentage

Studies on the distribution and heredity of the agglutinogens and blood factors have shown that certain of them are related to others so as to form systems. Certain blood factors have the peculiarity that blood lacking the factor or blood possessing the factor is extremely rare. Table 5 summarizes the present status of knowledge of the human blood groups, with special reference to their medicolegal application. When blood tests are carried out in problems of disputed parentage, the examination is usually limited to the A-B-O, M-N, and Rh-Hr systems. Moreover, the tests are further limited to particular factors of these three systems. In the preceding report of 1952, it was recommended that the medicolegal application of the blood test should not be extended further for the time being. For reasons pointed out below, it is still premature to apply these newer tests routinely in medicolegal cases, though there might be special circumstances when their use would be permissible.

A-B-O System.—For general medicolegal purposes, the blood tests should be restricted to the factors **A** and **B** and to the four blood groups, O, A, B, and AB. The tests should include examination of the serum (or plasma) of each individual for its isoagglutinin content, as well as tests on the red blood cells with anti-**A** and anti-**B** serums.[6] Some workers recommend the use of high-titered group O testing serum in order to detect blood cells of the rare subgroup A_4. Tests for the subgroups of A are not sufficiently reliable for medicolegal use. The serologic distinction between agglutinogens A_1 and A_2 is not sharp, so that the diagnosis is not infrequently difficult to make, especially in newborn babies and in individuals of group AB. Moreover, intermediate forms exist between A_1 and A_2. Therefore, this committee finds that tests for the subgroups of A remain too unreliable for general medicolegal use. At any rate, the chances of excluding paternity for a falsely accused man, which is about 18.5% using factors **A** and **B**, would be increased by only 1 or 2% were the subgroups of A applied (table 5).

M-N-S System.—For medicolegal purposes the paternity blood tests are preferably restricted to the factors **M** and **N**. Antiserums for these factors are prepared in rabbits, and from most of the antiserums satisfactory reagents can be prepared that give reactions of high avidity and specificity. The reagents, particularly for factor **N**, are generally of low titer,

Parentage by Rh-Hr Tests[6]

Phenotype of Putative Father—Continued						
6 rh/rh'	7 Rh_0	8 Rh_1rh	9 Rh_1Rh_1	10 Rh_2	11 Rh_1Rh_2	12 Rh_2Rh_2
1, **3**, 4, **6**, 7, 8, **9**, 10, 11, **12**	2, **3**, 4, 5, **6**, 8, **9**, 10, 11, **12**	**3**, 4, 5, **6**, **9**, 10, 11, **12**	1, **3**, 4, 5, **6**, 7, **9**, 10, 11, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**
1, 4, 7, 8, 9, 10, 11, 12	3, 4, 5, 6, 9, 10, 11, 12	4, 5, 6, 10, 11, 12	1, 4, 5, 6, 7, 10, 11, 12	3, 6, 9, 12	None	1, 4, 7, 10
1, 2, 4, 5, 7, 8, 9, 10, 11, 12	3, 4, 5, 6, 7, 9, 10, 11, 12	1, 4, 5, 6, 7, **10**, 11, 12	1, 2, 4, 5, 6, 7, 8, 10, 11, 12	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11
1, **3**, 4, **6**, 7, 8, **9**, 10, 11, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**
1, 4, 7, 8, 9, 10, 11, 12	3, 6, 9, 12	None	1, 4, 7, 10	3, 6, 9, 12	None	1, 4, 7, 10
1, 2, 4, 5, 7, 8, 9, **10**, 11, 12	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11
1, **3**, 4, **6**, 7, **9**, 10, **12**	2, **3**, 4, 5, **6**, 8, **9**, 10, 11, **12**	**3**, 4, 5, **6**, **9**, 10, 11, **12**	1, **3**, 4, 5, **6**, 7, **9**, 10, 11, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**
1, 4, 7, 10	3, 4, 5, 6, 9, 10, 11, 12	4, 5, 6, 10, 11, 12	1, 4, 5, 6, 7, 10, 11, 12	3, 6, 9, 12	None	1, 4, 7, 10
1, 2, 4, 5, 7, 8, **10**, 11	1, 3, 4, 5, 6, 7, 9, **10**, 11, 12	1, 4, 5, 6, 7, **10**, 11, 12	1, 2, 4, 5, 6, 7, 8, **10**, 11, 12	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11
1, **3**, 4, **6**, 7, **9**, 10, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**	2, **3**, 5, **6**, 8, **9**, 11, **12**	**3**, **6**, **9**, **12**	1, **3**, 4, **6**, 7, **9**, 10, **12**
1, 4, 7, 10	3, 6, 9, 12	None	1, 4, 7, 10	3, 6, 9, 12	None	1, 4, 7, 10
1, 2, 4, 5, 7, 8, **10**, 11	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11	1, 3, 4, 6, 7, 9, **10**, 12	1, 4, 7, **10**	1, 2, 4, 5, 7, 8, **10**, 11

is excluded. This table was prepared after an examination of a similar table prepared by Dr. W. C. Boyd. The phenotypes have been presented and numbered in an order different from that used by Dr. Boyd. The committee believes this order to be more logical, but Dr. Boyd informs us that he still prefers the order used in his version of the table. He also informs us that he does not approve of the inclusion in the table of numbers corresponding to phenotypes of children who could not be born to the mother in question.

use. At any rate, the chances of excluding paternity for a falsely accused man, which is about 18.5% using factors **A** and **B**, would be increased by only 1 or 2% were the subgroups of A applied (table 5).

M-N-S System.—For medicolegal purposes the paternity blood tests are preferably restricted to the factors **M** and **N**. Antiserums for these factors are prepared in rabbits, and from most of the antiserums satisfactory reagents can be prepared that give reactions of high avidity and specificity. The reagents, particularly for factor **N**, are generally of low titer,

but this does not appear to interfere with the reliability of the results. It is recommended that the tests be carried out with at least two different antiserums of each specificity. Satisfactory anti-N reagents can also be prepared from the seeds of Vicia graminae, which may be used if desired for purposes of confirmation.[7] Under no circumstances should the diagnosis be based solely on tests with such extracts. Tests on tens of thousands of families and mother-child combinations have proved that exclusion of paternity based on the M-N types is as reliable as exclusion based on the A-B-O tests.

Reagents for factor **S** are obtained from human individuals sensitized by transfusion or pregnancy. While the titer of these reagents is generally low, the reactions test for factor **s** will be perfected, since the combined tests for **S** and **s** will increase substantially the chances of excluding paternity. The addition of anti-**S** alone adds about 40% as much as the addition of both anti-**S** and anti-**s**. Antiserums for factors Hunter and Henshaw (table 5) are still in limited use, so that such tests are not yet available for medicolegal purposes. Recent work indicates that factor **U** is related to the M-N-S system, but, because of the almost universal distribution of this factor, it has little medicolegal importance.

Rh-Hr System.—As has already been pointed out, in medicolegal cases the paternity blood tests are generally limited to the factors **Rh$_0$**, **rh′**, **rh″**, and **hr′**. Actually many more Rh-Hr factors have been found. Of all the Rh-Hr factors known, the most important are the four

TABLE 5.—*Blood Groups in Man: Medicolegal Application*

System	Blood Factors	Number of Identifiable Types	Isoantibodies		Identification*		Exclusion of Paternity	
			Natural	Isoimmune	Factors Tested for	Chances of Success, %†	Factors Tested for	Chances of Success, %‡
A-B-O	**A, B, C, O,** and variants such as **A$_1$, A$_2$, A$_{1,2}$,** and **A$_3$,** and **A$_4$**	6 major groups and subgroups—O, A_1, A_2, B, A_1B, A_2B; also rarer subgroups as A_3, A_3B	Regularly present except during neonatal period	Common	**A$_1$-A-B**	67.2	**A-B**	17.6
							H-h	18.6
M-N-S	**M, N, S, s, Hu** (Hunter), **He** (Henshaw), **U,** and variants such as **M$_2$, N$_2$**	6 major types using the more readily available serums anti-**M**, anti-**N**, and anti-**S**	Rare	Rare	**M-N-S-s**	83.6	**M-N-S**	27.4
Rh-Hr	**Rh$_0$, rh′, rh″, rh^w, hr′, hr″, hr,** and variants such as **Rh$_z$**	28 major types, but only 9 have frequencies greater than 1%	A few questionable cases reported	Common	**Rh$_0$-rh′-rh″-rh^w-hr′-hr″**	80.5	**Rh$_0$-rh′rh″ hr′**	25.0
P	**P** and variants, **Tj^a**	2 major types	Infrequent	Very rare	**P**	33.4		
K-k	**K** and **k**	3	None reported	Occasional	**K-k**	16.3		
Lutheran	**Lu**	2	None reported	Rare	**Lu^a**	14.1		
Duffy (Fy)§	**Fy^a** and **Fy^b**	2 major types, because anti-**Fy^b** serum is not available	Rare	Several cases	**Fy^a**	45.1		
Lewis (Le)	**Le^a** and **Le^b**	3 (?)	Infrequent	Rare	**Le^a-Le^b**	43.3		
Kidd (Jk)§	**Jk^a** and **Jk^b**	2 major types, because anti-**Jk^b** serum is not available	None reported	Few cases	**Jk^a-Jk^b**	62.5		
"Private" blood types								
Rare blood factors	**Levay, Gr** (Graydon), **Bi^a** (Miltenberger), **Vw, Sasker, Be^a** (Berrens), **Ca** (Cavaliere), **Wr^a, Diego¶**	Positively reacting bloods are very rare	None reported	Very rare				
Factors with almost universal distribution	**Vel** and **I**	Negatively reacting bloods are very rare	None reported	1 case anti-**I**; 2 cases anti-**Vel**				

* The figures for the chances given in this column are based on figures given in Race and Sanger's "Blood Groups in Man," ed. 2, 1954. Additional relevant calculations have been made by Boyd, *Boston Med. Quart.* 1:28-29, 1950.

† Chances of success (1) Identification refers to the chance of proving that a given blood sample did not come from a specific individual, because of a difference in blood group; (2) Exclusion of paternity gives the chance of proving that a falsely accused man is not the father of a given child.

‡ The combined chance of excluding paternity, using the A-B-O, M-N, and Rh-Hr systems is approximately 55%. The **P, K-k, Fy^a, Jk^a,** and **Lu^a** factors, if applied, would increase the chances by only 6 or 7%.

§ Some workers use the simpler symbols **F** and **f** for the blood factors of the Duffy system and the symbols **J** and **j** for the blood factors of the Kidd system.

¶ The Diego factor is common, however, among Amerindians. Recent work indicates that the rare blood factors **Bi** and **Vw** are related and belong to the M-N-S blood group system.

are of high avidity and specificity like the tests for **M** and **N**. However, the number of studies to date on the **S** factor is small, because of the scarcity of this reagent, which, unlike anti-**M** and anti-**N** cannot, at present, be produced at will. Therefore, the medicolegal application of the **S** test should be limited to selected cases, and exclusions of parentage based on this test alone should be qualified by pointing out that the statistical basis for this test is still incomplete, though there is no reason to doubt its validity. Reagents for anti-**s** are even rarer than anti-**S**. Moreover, the anti-**s** reagents available up to the present had to be used with the antiglobulin technique, and the results were reproducible only with difficulty. For these reasons, the medicolegal application of factor **s** is not recommended for the present. It is hoped that the technique of the Rh factors **Rh$_0$**, **rh′**, **rh″**, and **rh^w** and the three Hr factors **hr′**, **hr″**, and **hr**. The reactions of these seven antiserums and the types they determine are given in table 1.

As can be seen from table 1, as many as 28 sharply defined Rh-Hr phenotypes can be differentiated with the aid of the 7 Rh-Hr serums, corresponding to which there are 55 genotypes theoretically possible. This does not take into account the additional phenotypes and genotypes resulting from the existence of **Rh$_0$** variants and certain other rare Rh-Hr agglutinogens. In practice the number of phenotypes encountered will be considerably smaller, because many of the phenotypes are rare. Thus, if only those phenotypes that have an incidence of 1% or higher are counted, there are only 9 or 10 phenotypes among those theoretically possible

that are apt to be encountered in tests on a short series of individuals. The medicolegal expert must also be aware of the existence of rare individuals with an agglutinogen having the factor **Rh$_o$** but lacking both factors of each of the two pairs **rh′-hr′** and **rh″-hr″**. Such bloods have been labeled as "deletions," but a more conservative designation for this type is Rh$_o$[a] with $R^{o}R^{o}$ as the corresponding genotype. The existence of these rare agglutinogens affects the validity of the rule that an **rh′**-negative parent cannot have an **hr′**-negative child and an **hr′**-negative parent cannot have an **rh′**-negative child. For example, if the putative father belongs to type Rh$_1$Rh$_1$ and the child to type Rh$_2$, paternity is not necessarily excluded, provided the man's genotype is R^1R^{o}, and the baby's genotype R^2R^{o}. Therefore, such exclusions of paternity call for some mild qualification. No qualification is needed when the rule is recorded as follows: An **rh′**-negative parent lacking the **Rh$_o$** factor cannot have an **hr′**-negative child, and an **hr′**-negative parent cannot have an **rh′**-negative child lacking the **Rh$_o$** factor. It has been found that individuals who carry the gene R^{o}, either heterozygous or homozygous, have red blood cells which are clumped by conglutinating **Rh$_o$** antiserums, even when the tests are carried out in saline medium. It would appear, therefore, that this additional test would eliminate the need for any qualification.

The availability of anti-**rh″** serum further increases the chances of excluding paternity. Aside from the fact that the **rh″** factor cannot appear in a child unless present in one or both parents, particular combinations exclude paternity in certain instances where no decision would be possible without the aid of this antiserum. For example, a parent of type Rh$_1$"rh cannot have a child of type Rh$_1$Rh$_1$, and a parent of type Rh$_1$Rh$_1$ cannot have a child of type Rh$_1$"rh.

The use of anti-**hr** serum (table 1) may help resolve certain problems of disputed parentage. The recently discovered factor **hr** has no Rh factor counterpart, thus differing from factors **hr′ and hr″**, which have the counterparts **rh′** and **rh″** respectively. With possible rare exceptions, the factor **hr** has been found present only in the agglutinogens determined by genes r and R^{o} and is absent from the agglutinogens determined by the genes r', r'', r^{y}, R^1, R^2, and R^{z}. Thus, the counterpart of anti-**hr**, which may be designated anti-**rh**, when and if it is found, can be recognized by the fact that it will behave like a mixture of anti-**rh′** and anti-**rh″**. When a putative parent belongs to type Rh$_o$ (blood with the three factors **Rh$_o$**, **rh′**, and **rh″**), and the child to type rh or Rh$_o$, or vice versa, parentage is excluded, provided it can be shown that the individual of type Rh$_o$ is not carrying the genes R^{z} or r^{y}. This may be possible with the aid of anti-**hr** serum, namely, if it can be shown that the blood has factors **hr′** and **hr″** but lacks the **hr** factor (table 1).

As already mentioned, certain workers routinely use anti-**hr″** serum in medicolegal cases of disputed paternity. The use of this serum adds little to the chance of excluding paternity because of the low frequency of **hr″**-negative individuals in the population (table 1). Moreover, the experimental basis for the practical application of these tests is not very firm, since only a few publications describe heredity studies in which anti-**hr″** serum was used. Therefore, the Committee does not recommend the routine medicolegal application of this reagent, though it is recognized that the test may prove helpful in occasional selected cases.

Recent work has revealed the existence of still other factors belonging to the Rh-Hr system, notably, factor **V**, often found associated with the genes r and R^{o}, especially in Negroes.[9] In addition, a series of new Rh factors has been discovered that, with rare exceptions, occur in association with the factor **Rh$_o$** (similar to the association of factor **rh″** with **rh′**) and that have tentatively been designated as **Rh^A**, **Rh^B**, and so forth.[9] Obviously, the medicolegal application of such factors is premature. Indeed, because of the lack of availability of adequate amounts of suitable antiserums and the limited knowledge due to the small number of investigations carried out to date, the routine use in medicolegal work of factors **rh″**, **hr″**, and **hr** is inadvisable. This Committee recommends, therefore, that for routine medicolegal work, for the present, the Rh-Hr tests be limited to the factors **Rh$_o$**, **rh′**, **rh″**, and **hr′**.

P System.—The antiserums available for use have been mostly of human origin and contain irregular agglutinins giving most distinct reactions at low temperature. Due to the presence in such serums of interfering nonspecific cold agglutinins, and the low titer of these reagents, the results of such tests are not sufficiently reliable for medicolegal purposes. This committeee, therefore, recommends that the P tests should not be used in routine medicolegal practice. Recent work indicates that the high incidence factor **Tj^a** is related to the P system. It should also be mentioned that the so-called **Q** factor of Japanese investigators is probably identical with factor **P**.[10]

Lewis System.—Knowledge of the Lewis system, insofar as its medicolegal applications are concerned, is still in a confused state due to the lack of potent and specific reagents. The only reagents available appear to be natural irregular isoagglutinins encountered in rare human serums, which react best at low temperature and rarely have a titer exceeding 2 to 4 units. Due to the presence of interfering cold agglutinins, especially anti-**O** in many anti-**Le^a** serums, these tests are not sufficiently reliable for medicolegal use.

Kell System.—Many additional examples of anti-**K** serum have been encountered during recent years, and all have similar properties, in that they react best by the conglutination and antiglobulin technique. Therefore, these reagents should not be used for typing blood with red blood cells already coated by antibody globulin, as in infants with hemolytic disease or patients with acquired hemolytic anemia. Moreover, the agglutinates are somewhat more fragile than in Rh-Hr reactions, so that the reactions are not always readily reproducible. This difficulty in technique has apparently discouraged extensive investigation of this system. Furthermore, the use of the rare anti-**k** serum adds little information, since only one out of approximately 500 bloods fails to clump in such antiserums. For these reasons, as well as the small number of family studies carried out to date, this committee recommends that the K-k tests should not be used in routine medicolegal practice but be reserved for special cases only.

Duffy and Kidd Systems.—The Duffy and Kidd systems are grouped together because of the similarity in behavior of the available reagents. These reagents give the most distinct reactions only by the antiglobulin method, and the agglutinates are even more fragile than those encountered in the Kell tests. Because of the difficulty in reproducing the reactions, and the small number of family studies carried out to date, in the opinion of this committee, the Duffy and Kidd tests are not suitable for routine medicolegal purposes. Therefore, this committee recommends that tests for factors **F** (or **Fy**^{a}) and **J** (or **Jk**^{a}) should not be carried out in routine medicolegal practice. However, there are some experts who feel that these tests are sufficiently reliable for medicolegal use.

The so-called family or private factors (table 5) have little or no value in medicolegal practice because of their rarity in the general population.

Blood Tests as Circumstantial Evidence of Parentage

The expert in the field of blood grouping is accustomed to think of blood tests as a method of establishing nonparentage only. When the blood types of the child match genetically with those of the supposed parents this is considered an inconclusive finding because of the possibility of coincidence. However, with the increase in the number of detectable blood factors and the number of blood group systems whose mode of inheritance is known, the possibility suggests itself of using blood tests as circumstantial evidence of paternity or maternity. "Assignment" of parents is occasionally possible in disputed parentage cases involving cattle.[11]

In almost all cases, despite the combined use of A-B-O, M-N, and Rh-Hr tests, such circumstantial evidence of parentage will be weak. For example, if both putative parents and the child belong to type O M Rh_1rh, there is a substantial chance of coincidence. Exactly where to draw the line is difficult to state. This committee feels, therefore, that the use of blood tests as circumstantial evidence of paternity is not advisable in routine medicolegal practice. In fact, attempts to apply blood tests in this way carry the danger that they may serve to confuse the issue and cause the court to discredit the blood tests altogether.

On the other hand, there are certain unusual cases that cannot be ignored, where the use of blood tests as circumstantial evidence of paternity or maternity appears to be justified. For example, if the putative father belongs to type rh", the mother to type rh, and the child to type rh", the conscientious examiner will feel obligated to call this unusual circumstance to the attention of the court. Since rh" occurs in less than 0.5% of the population, the coincidental presence of this type in the child and the accused man is circumstantial evidence of paternity, assuming, of course, it is ascertained that a co-relative such as a brother of the same type as the accused cannot be involved. However, this committee feels that such an observation should not be included in the official report but should be mentioned and explained in a covering letter accompanying the report. Other situations in which the results of blood tests may perhaps be considered circumstantial evidence of paternity are cases where the child and accused man both belong to type rh' or both have the factor rh", lacking from the blood of the mother. As another example the instance where the baby and the putative father both are Kell positive and group B, while the mother is Kell negative and group O, may be cited.

Model Blood-Grouping Law

To further the medicolegal application of blood-grouping tests in cases of disputed paternity, the passage of state laws authorizing courts to order these tests appears to be necessary. At the time when the previous report of this committee was published, laws had been passed in the states of Maine, Maryland, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Dakota, and Wisconsin. During the past five years four more states have been added to the list, namely, Connecticut, Massachusetts, Minnesota, and New Hampshire. The main obstacle to the adoption of similar laws by all states is the dearth of qualified experts specializing in the field of blood grouping. Even among workers in the field, unnecessary controversy regarding nomenclature certainly has not helped to instill confidence in the tests among lawyers and jurists. From the point of view of the legislator and jurist, the wider medicolegal application of blood tests may be fostered by the availability of a model blood-test law. A Uniform Act on Blood Tests to Determine Paternity was drafted by the National Conference of Commissioners on Uniform State Laws and approved by the conference at its annual meeting in San Francisco, Sept. 8-13, 1952. This act was later approved by the American Bar Association at its meeting in San Francisco, Sept. 19, 1952.

The proposed uniform act has many commendable features. However, the following simplified version of the proposed act would be an improvement, in the opinion of this committee.

Uniform Act on Blood Tests in Cases of Disputed Parentage in Man

Be it enacted (use the proper enacting clause for the state).

Section 1. Authority for Test. In a civil action in which parentage is a relevant fact, the court, upon its own initiative or upon motion of any party in the action shall order the mother, child, and alleged father, to submit to blood tests.

Section 2. Selection of Experts. The tests shall be made by qualified experts in the field of blood grouping who shall be appointed by the court. For a list of such experts the court shall apply to the local medical association or to the American Medical Association. The expert may be called by the court to testify on the findings and shall be subject to cross-examination. Any party may demand that other qualified experts perform independent tests under order of the court.

Section 3. Compensation of Expert Witnesses. The compensation of each expert appointed by the court shall be fixed at a reasonable amount, and paid as the court shall order.

Section 4. Effect of Test Results. If the blood tests show that the alleged parent is not the parent of the child, such a finding shall be admissible as evidence. If the blood tests show the possibility of the alleged parents' parentage, the admission of such evidence shall be within the discretion of the court.

Section 5. Effect on Presumption of Legitimacy. The presumption of the legitimacy of a child born during wedlock is overcome if the court finds that the blood tests show that the husband is not the father of the child.

Section 6. Applicability to Criminal Actions. This act shall also be applicable in criminal cases in which the problem of parentage arises, such as cases of rape and kidnapping.

Section 7. Severability Clause. If any part of this act is declared invalid the remaining portion shall continue in full force and effect and shall be construed as being the entire act.

SECTION 8. Short Title. This act may be cited as the Uniform Act for Blood Tests in Disputed Parentage in Man.

SECTION 9. Repeal. All acts or parts of acts which are inconsistent with the provisions of this act are hereby repealed.

SECTION 10. Time of Taking Effect. This act shall take effect.....

Two important aspects of the medicolegal application of blood tests are the questions of qualifications of experts and the application of blood tests in the examination of dried stains of blood and secretions. These two subjects are not treated here because they have already been discussed in the report published in 1952, and no important changes have occurred. It is essential that only qualified workers carry out these examinations, because serious errors have occurred when inexperienced workers undertook to perform these tests. It must be borne in mind that blood tests are performed by natural persons, so that experts to be qualified are individuals and not institutions. A detailed discussion of the pitfalls in the grouping of dried blood stains can be found in a recent article on the subject.[12] The question of qualifications of experts remains a difficult and unsolved problem requiring serious study.

Summary and Conclusions

Because the use of two systems of nomenclature for the Rh-Hr system leads to confusion and misunderstanding, the Committee on Medicolegal Problems of the American Medical Association recommends the adoption of a single uniform system for medicolegal reports. Of the two available systems, the Committee favors the Rh-Hr over the C-D-E for what it considers strong reasons. It recognized faults in both systems, and suggests that the achievement of an internationally acceptable terminology is a desirable objective. In the interim, it is recommended that, unless and until some other convention can be agreed upon, the original Rh-Hr notations be kept as the standard and sole nomenclature for preparing approved medicolegal reports on Rh-Hr types.

It is recommended that routine medicolegal applications of blood grouping be restricted at present to tests for the four blood groups O, A, B, and AB of the A-B-O system; the three types M, N, and MN of the M-N-S system; and factors **Rh$_o$**, **rh'**, **rh"**, and **hr'** of the Rh-Hr system. Tests for additional factors and systems are considered insufficiently established for routine use at present, although they may provide evidence in particular selected cases. Such evidence should be submitted in a separate letter not part of the standard report and should be presented with proper caution. Similarly, the value of rare combinations of groups providing indication of paternity, in contrast to the conventional use of the tests to establish only nonpaternity, should be recognized in unusual cases but should be treated with caution in a separate communication not part of the definitive report. The question of qualification of experts remains a difficult and unsolved problem requiring serious study.

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11. Stormont C.: Personal communication to the Committee.

12. Wiener, A. S., and Gordon, E. B.: Examination of Blood Stains in Forensic Medicine, J. Forensic Sc. (no. 3) **1**:82-102, 1956.

Recent Court Decisions

Prochnow v. *Prochnow*, 80 N.W. (2d) 278 (Wis., 1957).—The results of a blood test excluding paternity were held not to be conclusive where the statute requires that "any party asserting the illegitimacy of the child . . . shall have the burden of proving beyond all reasonable doubt that the husband was not the father of the child." The child was held to be legitimate on testimony of wife that she had timely intercourse with her husband and none other.

Ross v. *Marx*, 93 A. (2d) 597 (N.J., 1952).—Medical testimony was introduced to show the results of blood-grouping tests conducted on the plaintiff, her child, and the defendant. The tests definitely established nonpaternity. The trial judge stated that he thought the results of such tests were conclusive on the issue of paternity. The superior court acknowledged that, under statute, the results of such tests are admissible in evidence only when they definitely establish exclusion. It held, however, that the results are not conclusive. Evidence that the test was incompetently administered would be properly admissible.

Clark v. *Rysedorph*, 118, N.Y.S. (2d) 103 (N.Y., 1952).—During the course of the trial the judge ordered three separate blood-grouping tests to be conducted on the plaintiff, her child, and the defendant. Two M-N tests and one A-B test were given. Each test excluded the defendant as the father of the plaintiff's child. When such evidence is uncontradicted, it is conclusive. To reject such testimony, said the court, would be to ignore scientific facts.

Miller v. *Domanski*, 97 A. (2d) 641 (N.J., 1953).—The trial court, pursuant to state statute, directed Dr. Philip Levine to perform blood-grouping tests on the plaintiff, her child, and the defendant in a bastardy proceeding. Dr. Levine testified that, unless the assumption was made that the plaintiff had a very rare and unusual genetic make-up, the tests did show exclusion. The court then refused to permit him to testify as to the results of the tests, even though, when the pertinent statute was enacted in 1939, the problem of an unusual serologic make-up was unknown to medical science. The superior court held that the trial court correctly applied the statute, which forbids using the results of blood-grouping tests as evidence except where such tests definitely establish exclusion, and judgment for the plaintiff was therefore affirmed.

United States ex rel. Lee Kum Hoy v. *Shaughnessy*, 115 F. Supp. 302 (S.D.N.Y., 1953).—The admission into evidence at an administrative hearing of the bare blood-grouping reports and the failure to provide opportunity to cross-examine the doctor as to the qualifications of the test constituted a denial of due process.

United States ex rel. Dong Wing Ott v. *Shaughnessy*, 116 F. Supp. 745 (S.D.N.Y., 1953).—An administrative tribunal does not violate due process by taking official notice of scientific treatises on the subject of blood-grouping tests in exclusions of paternity.

Chin Wing Gwong v. *Dulles*, 139 F. Supp. 116 (D.R.I., 1956).—Blood tests excluding paternity were denied conclusive weight on the ground that the qualifications of the testing procedure were not shown.

Pomainville v. *Bicknell*, 109 A. (2d) 342 (Vt., 1954). Conclusive weight to blood tests excluding paternity was denied by the court because the technician who conducted the tests failed to testify.

People v. *Nichols*, 67 N.W. (2d) 230 (Mich., 1954). The results of blood-grouping tests that do not exclude paternity have "not the slightest probative value or tendency to prove . . . paternity" and are inadmissible in evidence.

Lee On v. *Dulles*, 131 F. Supp. 310 (Mass., 1955).—The refusal to submit to a test by a nonparty whose blood groupings are relevant to the issue of paternity does not warrant an inference that the nonparty feared the results where the refusal is due to "the inability . . . to meet costs of blood tests and expert witnesses to controvert unfavorable conclusions which government experts might erroneously draw from the results of these tests."

Lee Wing Get v. *Dulles*, 18 F.R.D. 415 (E.D. N.Y., 1955).—In an action for derivative citizenship, the court, apparently forgetting the demise of the Rules of Conformity Act, ordered the blood test of a nonparty mother under New York Civil Practice Act, section 306-a.

Fong Sik Leung v. *Dulles*, 226 Fed. (2d) 74 (9 Cir., 1955); *Yee Szet Foo* v. *Dulles*, 18 F.R.D. 237 (S.D. N.Y., 1955); *Dulles* v. *Quan Yoke Fong*, 237 Fed. (2d) 496 (9 Cir., 1956).—Where an infant seeks a declaratory judgment in a suit by his father-guardian *ad litem*, the court may not order, under rule 35 (a) of the Federal Rules of Civil Procedure, blood tests of the father–next friend, the parents, or the brothers or sisters.

Chin Nee Deu v. *Dulles*, 18 F.R.D. 350 (S.D. N.Y., 1955).—Under the provisions of rule 35 (a) of the Federal Rules of Civil Procedure, in an action to which the physical condition of a party is in controversy, the court may order him to submit to a physical examination by a physician. Thus, where an infant seeks a declaratory judgment of his own derivative citizenship in an action brought by his "father" as next friend, the infant may be compelled to submit to a blood test, but the court may not order blood tests of the father–next friend.

NOTE: Blood tests for nonparentage on an individual seeking admission to this country on the basis of derivative citizenship, without testing his putative parents, would obviously be pointless.

Arteriosclerotic Aneurysms.—Arteriosclerotic aneurysms occur in degenerative disease of the thoracic aorta and are a malady of the elderly. Arteriosclerotic aortic aneurysms may be asymptomatic, but often there is a history of hypertension. When symptoms occur the situation is ominous. Backache may be due to erosion of the bodies of the dorsal vertebrae by the aneurysm; hoarseness can be caused by recurrent laryngeal nerve paralysis; and hemoptysis can be caused by erosion or stenosis of a large pulmonary artery. In a small series of six cases diagnosed with the aid of angiocardiography . . . the majority had symptoms due to the aneurysm; of these, three (50%) were dead within a year. Diagnosis of aneurysms of the thoracic aorta depends upon the roentgen findings of mediastinal or hilar masses or an enlarged aorta. Differentiation from mediastinal tumors may be difficult, if not impossible. It then becomes necessary to perform contrast studies of the cardiovascular system. Angiocardiography can be depended upon to reveal saccular and fusiform aneurysms, as well as dilatation, tortuosity, unfolding and congenital anomalies of the aorta. The diagnosis of arteriosclerotic aneurysms of the aorta depends upon the presence of a negative history and serologic test for syphilis in the older age groups, and the location of the aneurysm in the arch and descending portions. The absence of severe dilatation and a regular smooth ascending aorta . . . favor the diagnosis of arteriosclerosis. . . . The decision to perform surgery for arteriosclerotic thoracic aneurysms must take into account the advanced age and the tendency for arteriosclerosis to occur elsewhere. In the heart, there may be coronary thrombosis or insufficiency; in the brain, cerebral thrombosis or hemiplegia; in the abdomen, aortic aneurysm or occlusion; and in the legs, arterial occlusion or insufficiency. . . . Despite all these, constant vigilance to detect the case suitable for surgery is recommended.—I. Steinberg, M.D., Diagnosis of Arteriosclerotic Aneurysms of the Thoracic Aorta, *Annals of Internal Medicine*, February, 1957.

COMMITTEE ON REHABILITATION

REPORT OF THE COMMITTEE ON REHABILITATION

The following report, which has been reviewed by the Board of Trustees of the American Medical Association, has been adopted for publication by the Association's Committee on Rehabilitation.

RALPH E. DE FOREST, *M.D., Secretary.*

During the past 50 years medicine has made rapid advances in its ability to save the lives of the sick and injured. In this period our life span has been increased by more than one-third. A longer life span, together with a growing population and the increased number of persons injured during their daily activities of work and play, has resulted in a tremendous rise in the number of disabled individuals. The disabled and handicapped may become a burden on their families or society and may, even more unfortunately, become engulfed in their own feelings of insecurity, despair, and hopelessness. In response to the needs of the disabled and handicapped, a humanitarian movement, "rehabilitation," has developed and continues to expand in the United States. Since rehabilitation services are provided in so many ways, some confusion exists as to what is meant by and included within this term. However, some confusion is to be expected during the course of the expansion and development of almost any concept of such magnitude as that encompassed by present-day rehabilitation.

Stated in broad and simple terms, rehabilitation services provide the total medical care needed to restore the sick and injured to maximal obtainable function, assist in psychological and social adjustment, provide occupational retraining if necessary, and either secure employment if possible, or at least strive to develop independence so that the individual may become self-sustaining. Success in rehabilitation is dependent, then, upon comprehensive care, including (1) medical and surgical diagnosis and treatment which must continue beyond the end of the "acute stage" of disease or injury to the point of maximal reduction of physical or mental disability, (2) social service, (3) vocational retraining and counseling, and (4) job placement.

There is need for increased utilization of the many ancillary personnel such as physical therapists, occupational therapists, clinical psychologists, and others who work under direct medical supervision. The physician also needs to become aware of the great amount of work already done in the nonmedical aspects of rehabilitation in the fields of education, sociology, and vocational counseling and placement. This is necessary because, in addition to the medical care provided by the physician, the patient must also receive the benefits of these other fields dedicated to the betterment of the disabled. It seems reasonable to assume, however, that the physician should accept leadership in seeing that adequate and total rehabilitation services are available to his patients. The physician should take the lead and direct the rehabilitation team if the important, traditional physician-patient relationship is to be maintained and his patients are to receive all of the benefits total rehabilitation has to offer. To assure that ancillary personnel are adequately trained to assume their responsibilities as members of the rehabilitation team, physicians should also actively participate in teaching the medical aspects of educational programs for such personnel.

Every individual physician can and should assume responsibility for the rehabilitation of his patients. Accomplishment does not depend so much upon the rehabilitation center as it does upon the mobilization, integration, and provision of rehabilitation services. The physician should ascertain what rehabilitative, community, and specialized medical services are available, and direct his patient to them as necessary. Although both federal and private national organizations are interested in rehabilitation, actual service is provided to the individual at the local level. County and state medical societies should catalogue for the benefit of their members the various medical, social, and educational agencies providing services to the rehabilitee within the state, county, and community.

The Committee believes that its activities in the development of rehabilitation should proceed with the following objectives as guides to its work: (1) to coordinate the rehabilitation interests and activities within the councils, bureaus, committees, and departments of the American Medical Association; (2) to foster medical supervision of rehabilitation services and centers; (3) to study the problems and interrelationships of the medical, social, educational, and vocational aspects of rehabilitation; (4) to inform the medical profession of the availability of information regarding rehabilitation; (5) to collect information concerning the establishment of rehabilitation programs, their organization, methods of operation, and utilization by physician and patient; and (6) to encourage medical society interest and programs in rehabilitation.

In the process of carrying out this work, the Committee believes that some of the activities in which it might engage are as follows: (1) a review of the rehabilitation programs of national organizations through a perusal of written and published material and through conferences with representatives from these organizations; (2) a preparation of guides for medical societies to use in (*a*) reviewing the rehabilitation programs of local agencies and foundations, including availability of facilities and services and the extent and type of research, (*b*) determining the need for facilities and services, and (*c*) developing liaison with local groups concerned with rehabilitation; (3) the preparation of guides for sound rehabilitation services and facilities; and (4) publication of a series of articles in THE JOURNAL of the American Medical Association on all aspects of rehabilitation. Such articles would be prepared by persons well qualified in the various aspects of rehabilitation.

Members of the Committee on Rehabilitation are Frank H. Krusen, M.D., Chairman; H. B. Mulholland, M.D., Vice-chairman; Oscar A. Sander, M.D.; Francis J. Gerty, M.D.; and Guy A. Caldwell, M.D.

COUNCIL ON DRUGS

Formerly the Council on Pharmacy and Chemistry

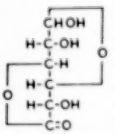
NEW AND NONOFFICIAL DRUGS

Formerly New and Nonofficial Remedies

Monographs and supplemental statements on drugs described here and in subsequent editions of New and Nonofficial Drugs are based on the evaluation of available scientific data and reports of investigations. Applicable commercial names for preparations of evaluated drugs are listed at the end of monographs and parenthetically in the text of supplemental statements; additional commercial names of which the Council is informed will be included with subsequently published supplemental statements and annual editions of New and Nonofficial Drugs.

H. D. KAUTZ, M.D., *Secretary.*

Glucurolactone.—γ-Lactone of D-glucofuranuronic acid.—The structural formula of glucurolactone may be represented as follows:



Actions and Uses.—Glucurolactone is the gamma lactone of glucuronic acid, an important body constituent that is believed to possess at least two significant metabolic functions. It is an essential unit of tissue structure, comprising part of the composition of connective tissue and collagen, particularly of cartilage, periosteum, nerve sheath, joint capsule, tendon, and synovial fluid. It also occurs in intercellular cement substance and in blood vessel walls. Glucuronic acid is of additional metabolic importance as a detoxifying agent, combining with many foreign and deleterious substances that are then excreted in the urine as innocuous glucuronic acid conjugates.

As a physiological body constituent, glucuronic acid and its more stable lactone have been considered possible therapeutic agents in several disease entities. Although they were previously suggested for a variety of purposes, clinical experience has centered principally about the use of these compounds in the treatment of arthritis, rheumatism, and associated collagen diseases. It has been surmised that the destruction of bone and cartilage, which characterizes these conditions, may result from a deficiency of glucuronic acid required for normal metabolism and that such deficiency may also involve the cement substance affected in the collagen diseases. It has also been surmised that patients in this category may suffer from a defect in detoxicating mechanism as indicated by excessive toxicity from focal and other infections. Although there is no valid evidence to support this view, glucurolactone has been proposed for use in arthritic conditions as an orally given absorbable, stable form of glucuronic acid to restore and maintain metabolic balance in fibrous tissue and to help meet daily detoxicating requirements. Although some observers believe that the drug exerts a beneficial clinical effect, the number of patients in which such results have been reported is too small to permit any positive conclusion. Since the presently available evidence is largely from uncontrolled studies, it is also difficult to determine whether the favorable responses thus far reported were due to the action of the drug or to spontaneous remissions so characteristic of this group of diseases. Thus, while there may be some hypothetical reasons for the use of glucurolactone for the treatment of joint and collagen diseases, a definite statement regarding its usefulness must await the results of better controlled, long-term clinical studies.

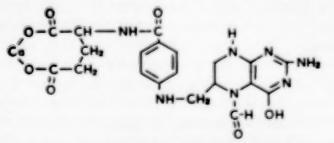
Unlike free glucuronic acid or its salts, glucurolactone is readily absorbed from the gastrointestinal tract. It is apparently broken down to free glucuronic acid in the body, since detectable increases in this constituent may be found in the blood and urine after the oral administration of its lactone. Both laboratory and clinical experience indicate glucurolactone to be a relatively nontoxic substance. In humans, prolonged administration has not been accompanied by any manifestations of serious deleterious effects. Occasionally, flushing of the face and mild gastrointestinal distress have been observed. These effects usually subside with a reduction in dosage or with temporary withdrawal of the drug.

Dosage.—Glucurolactone is administered orally. In the treatment of joint and arthritic-like conditions, the daily administration of 2 Gm. of glucurolactone in four divided doses should be considered experimental. If the drug is employed at all, administration for one month or more may be required before any therapeutic results are apparent. Should a favorable effect be obtained, maintenance dosage and duration of subsequent therapy should be governed by individual response. The trial of glucurolactone in arthritic patients does not obviate the need for more important and better established therapeutic measures.

Applicable commercial name: Glucurone.

Reed & Carnrick cooperated by furnishing scientific data to aid in the evaluation of glucurolactone.

Leucovorin Calcium.—Calcium 5-formyl-5,6,7,8-tetrahydropteroylglutamate.—The structural formula of leucovorin calcium may be represented as follows:



Actions and Uses.—Leucovorin calcium, the calcium salt of the active metabolite of folic acid, is utilized for growth of the bacterial species Leuconostoc citrovorum. Hence, leucovorin is frequently referred to as citrovorum factor or, less commonly, folinic acid. In man and animals, folic acid per se is metabolically inactive; it must be converted to leucovorin in the tissues in order to exert a stimulating effect on the proliferation of all blood cellular elements. If this conversion is blocked, as with the folic acid antagonists aminopterin or A-methopterin, hematopoiesis is depressed. This is, of course, the therapeutic effect desired in the treatment of acute leukemia of childhood. However, because of extreme potency and narrow margin of safety, therapy with the folic acid antagonists can be hazardous; hematopoietic response is sometimes very difficult to control, and even small errors in dosage can lead to irreversible bone marrow depression. In such situations, leucovorin calcium exerts a potent antidotal action since it provides an exogenous source of the active hematopoietic principle, the biosynthesis of which is blocked. There is adequate laboratory and clinical evidence to show that prompt administration of the drug after overdosage with any of the folic acid antagonists results in a reversal of both hematopoietic toxicity and the generalized toxic effect on all reticuloendothelial tissue. Whenever possible, therapy with leucovorin calcium should be initiated before susceptible cell groups have become too damaged by folic acid antagonists to be responsive to antidotal action. Hence, in cases of inadvertent overdosage, leucovorin should be administered as soon as the error is detected; if a period of more than four hours intervenes, the drug may not be effective. Leucovorin calcium should not be administered simultaneously with folic acid antagonists in an attempt to modify or abort clinical toxicity. Such a regimen may nullify completely the desired therapeutic effect. If signs of toxicity appear after use of the folic acid antagonists, the offending drug should be withdrawn immediately, and, along with general supportive measures, leucovorin calcium should be administered on a daily basis until hematological and clinical improvement is noted.

Because leucovorin calcium supplies the active metabolite needed for the proliferation and maturation of blood cellular elements, it is effective in ameliorating the blood picture in the megaloblastic anemias associated with pregnancy, infancy, sprue, and nutritional deficiency. However, the ability of the blood-forming organs to convert folic acid to the citrovorum factor is not impaired in these anemias. Accordingly, in the megaloblastic anemias, no particular purpose is accomplished by using leucovorin calcium, which must be injected parenterally, instead of folic acid, which may be taken orally.

Before the introduction of cyanocobalamin (vitamin B_{12}), leucovorin calcium was used for the treatment of pernicious anemia. The action of the drug in this condition is essentially the same as that of folic acid. Thus, while leucovorin calcium may restore to normal the blood picture in patients with pernicious anemia, it is ineffective in the control of neurological symptoms. Cyanocobalamin, which overcomes both the hematological and neurological effects of pernicious anemia, has displaced both folic acid and leucovorin calcium in the treatment of this condition.

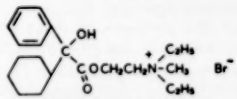
In therapeutic doses, leucovorin calcium appears to be essentially nontoxic. To date, no untoward effects or adverse reactions referable to the drug have been reported.

Dosage.—Leucovorin calcium is administered intramuscularly. To counteract the toxic effects of folic acid antagonists, the usual dose is 3 to 6 mg. per day. This is continued as long as signs of toxicity persist. For the treatment of megaloblastic anemias, a dose of 10 mg. may be injected daily for 10 to 15 days. Subsequent therapy and dosage is dependent upon the hematological response as reflected by both peripheral blood cell counts and bone marrow aspirations. Dosage of leucovorin calcium as an adjunct to cyanocobalamin therapy in the treatment of pernicious anemia has not been well defined, but amounts ranging from 0.2 to 15 mg. per day have been employed in this condition.

Applicable commercial name: Leucovorin.

Lederle Laboratories Division, American Cyanamid Company, cooperated by furnishing scientific data to aid in the evaluation of leucovorin calcium.

Oxyphenonium Bromide.—Diethyl(2-hydroxyethyl) methylammonium bromide α-phenyl-α-cyclohexylglycolate.—The structural formula of oxyphenonium bromide may be represented as follows:



Actions and Uses.—Oxyphenonium bromide, a synthetic quaternary ammonium compound, is used clinically as an anticholinergic agent. Its pharmacological actions, side-effects, and chemical structure are similar to those of tricyclamol chloride, tridihexethyl iodide, and hexocyclium methylsulfate. In addition to producing an antispasmodic effect on the musculature of the gastrointestinal tract, oxyphenonium bromide also diminishes gastric secretion. Thus, it is useful for the adjunctive management of peptic ulcer and for other disorders of the gastrointestinal tract, characterized by hypermotility or spasm, that are usually amenable to anticholinergic therapy. It may also be used in place of atropine or scopolamine as a preanesthetic medication in patients who are sensitive to the belladonna alkaloids. Currently available evidence confirms the usefulness of oxyphenonium bro-

mide as a potent antispasmodic but does not indicate any advantages that would distinguish the drug from other agents in this category.

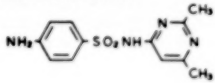
Side-effects to oxyphenonium bromide include those of the anticholinergic agents in general. Blurring of vision, dryness of the mouth, difficulty in urination, and constipation may follow its clinical use. Less common reactions have included weakness, dizziness, drowsiness, nausea, vomiting, headache, and tachycardia. The drug is contraindicated in the presence of glaucoma, prostatic hypertrophy, and pyloric obstruction.

Dosage.—Oxyphenonium bromide is given orally, subcutaneously, or intramuscularly. When immediate action is desired in severe gastrointestinal spasm with pain, 1 to 2 mg. (0.5 to 1 cc. of a 0.2% solution) may be injected subcutaneously or intramuscularly every six hours; oral therapy should then be substituted as soon as possible. The usual oral dosage for adults is 10 mg. four times daily. Dosage should be adjusted, however, according to individual response and the appearance of side-effects. For children, dosage is reduced proportionally according to age.

Applicable commercial name: Antrenyl Bromide.

Ciba Pharmaceutical Products Inc. cooperated by furnishing scientific data to aid in the evaluation of oxyphenonium bromide.

Sulfisomidine.—N'-(2,6-Dimethyl-4-pyrimidinyl)sulfanilamide.—The structural formula of sulfisomidine may be represented as follows:



Actions and Uses.—Sulfisomidine, a structural isomer of sulfamethazine, is useful for the treatment of systemic and urinary tract infections caused by microorganisms that are susceptible to the bacteriostatic effects of sulfonamides. In contrast to most other agents in this class, sulfisomidine is not readily acetylated in the body. Thus, after oral administration, only about 5 to 10% of total blood sulfonamide is conjugated, and about 90% of the drug appears in the urine in the free form. Since the free form of the drug is soluble in acid urine, sulfisomidine compares favorably with the other sulfonamides with respect to renal toxicity. Hematuria and crystalluria are only rarely encountered. Hence, concomitant alkalinization of the urine is not necessary to increase the solubility of the drug. As with all sulfonamide therapy, however, fluid intake should be maintained above 1.5 liters daily. Aside from diminished renal toxicity, the side-effects of sulfisomidine are similar to those of other sulfonamides. (See the general statement on sulfonamides and on pyrimidine derivatives in New and Nonofficial Remedies.)

Dosage.—Sulfisomidine is administered orally. The initial dose in severe infections is calculated on the basis of 0.1 Gm. per kilogram of body weight. Subsequent doses of one-sixth the initial dose should be given every four hours (six times a day) until the infection is well under control. Then dosage is decreased to four times a day until a cure is effected.

Applicable commercial name: Elkosin.

Ciba Pharmaceutical Products Inc. cooperated by furnishing scientific data to aid in the evaluation of sulfisomidine.

COUNCIL ON FOODS AND NUTRITION

Report to the Council

The Council has authorized publication of the following condensation of a report on atherosclerosis and diet which appears in the August, 1957, issue of Circulation. *The report was prepared by the nutrition committee of the American Heart Association in cooperation with the Society for the Study of Arteriosclerosis.*

PHILIP L. WHITE, SC.D., *Secretary.*

ATHEROSCLEROSIS AND THE FAT CONTENT OF THE DIET

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Atherosclerosis in all probability has no single cause. Among those factors presently implicated are (1) heredity, (2) diet, (3) anatomy of the blood vessel wall, (4) arterial blood pressure, (5) lipid content of the blood, and (6) sex. Because atherosclerosis is a focal lesion, its consequences are widely variable. There is no practical means of clinical diagnosis of uncomplicated, potentially reversible lesions. The approach to this problem by animal experiments has shown that atherosclerosis which is closely similar to, but not necessarily identical with, the human type can be produced in a variety of experimental animals by dietary variations. The results of such experiments have had a significant influence on the opinions of many clinicians.

The clinical diagnosis of coronary arterial heart disease dates substantially from the first decade of this century. No one questions the remarkable increase in the reported number of cases of this condition. Undoubtedly the wide use of the electrocardiogram

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in confirming clinical diagnosis and the inclusion, in 1949, of arteriosclerotic heart disease in the International List of Causes of Death play a role in what is often believed to be an actual increased prevalence of this disease.

The incidence of coronary heart disease has been reported to be associated with certain dietary habits, for instance, with the intake of fat. Comparative nutritional surveys range from estimates based on the food balance sheets of two nations to carefully measured food intakes of individuals. Estimates of national food balances may indicate trends in single countries or demonstrate wide differences in the adequacy of the diets available, but they have little application to small groups or to small differences.

That the genetic factor may be an influence is indicated by a recent cooperative study made by the life insurance companies. For periods of up to 15 years, they investigated 18,000 insured lives and showed conclusively that persons who had reported two or more cases of early cardiovascular renal disease in their families were subject to death rates from cardiovascular disease that were one and three-fourths to two and one-half times greater than prevailing rates among all persons insured at standard premium rates.[1]

Clinical Approach

The clinical approach to relating lipids to atherosclerosis depends primarily upon the association of increased incidence of atherosclerosis and coronary arterial disease with certain other diseases such as diabetes, myxedema, nephrosis, and xanthromatosis, all of which are commonly associated with hyperlipemia and hypercholesteremia. Experience indicates that the equation of atherosclerosis with hypercholesteremia is presumably valid, but it does not establish the association between fat intake and hypercholesteremia.

Cholesterol

Many years ago the clinical association between hypercholesteremia and atherosclerosis was correlated with the finding that rabbits fed cholesterol in oil developed atherosclerosis. Cholesterol, once regarded as an unmetabolizable building block in animal tissues, became to many the villain underlying arterial catastrophe. Although biologically the least significant, a large factor in this association was that the Liebermann-Burchard reaction made measurement of serum cholesterol easier than measurement of other serum lipids. In fact, the reaction may have concentrated too much attention on cholesterol at the expense of substances of equal or greater potential interest. The concentrations of plasma lipids usually tend to vary simultaneously in the same direction, and any one of them might be as significant as cholesterol.

Fat

Total Fat Intake.—Perhaps the total consumption of fat is relevant to clinical atherogenesis. Keys,[2] in particular, has placed emphasis on the proportion of total dietary calories contributed by the common food fats. Certainly there is an abundance of data, both clinical and experimental, which tend to relate excess fat intake to atherosclerosis. Unfortunately, other significant parameters such as total caloric intake, relative rate of caloric expenditure, true obesity, and exercise are not easily disentangled from the problems of excess fat intake. Consequently, this hypothesis finds opposition in some quarters.

Animal vs. Vegetable Fat.—The possibility has been raised that the kind rather than the amount of fat in the diet is responsible for atherogenesis. The first area of study has been a comparison of effects of animal fats with those of vegetable fats.

Some of the relevant data comes from studies of vegetarians. In one study it was found that serum cholesterol levels were higher in nonvegetarians than in lacto-ovo-vegetarians and true vegetarians. The lowest concentrations of cholesterol were found in the true vegetarians, in spite of the fact that 35% of their total calories came from fat.

The possible association between vegetarian diets and low levels of serum cholesterol is tested by the data from a study of Eskimos,[3] who have a high intake of meat and fat. With a procedure that yielded a mean value of 177 mg. per 100 cc. of total serum cholesterol for a control group of Canadians, the mean in 27 Eskimos was found to be 141 mg. (range 93 to 222) and in 6 Devon Island Eskimos, 132 mg. (range 116 to 158). The fats consumed were largely of marine origin and, like vegetable fat, relatively unsaturated. However, tuberculosis is common among Eskimos and may account for the relative lipopenia.

Unsaturated Fats.—The reported effects of vegetable fats on the cholesterol content of blood may be a function of their degree of unsaturation and/or of their content of so-called essential fatty acids. The parameter of saturation of fat as a significant factor in cholesteremia, and by extension, in atherosclerosis, recently has been explored in humans by Kinsell,[4] Ahrens,[5] Beveridge,[6] and Bronte-Stewart.[7] Their experiments showed that relatively unsaturated fats of vegetable or marine origin tend to lower serum cholesterol levels, whereas hydrogenated vegetable fats usually, and saturated animal fats rather regularly, tend to increase serum cholesterol levels.

Speculative hypotheses, like those of Sinclair [8] and Schroeder,[9] have been formulated. The starting point of this type of hypothesis is that cholesterol is normally esterified with unsaturated fatty acids. When these are unavailable, cholesterol esterifies with saturated fatty acids provided by the dietary fats or synthesized in the body from carbohydrate. The hypothesis states that it is these saturated cholesterol esters which tend to be deposited in the arterial intima. Important to this concept would be the body's inability to form arachidonic acid from linoleic acid (the so-called essential fatty acids); this latter synthesis may depend on pyridoxine. Therefore, pyridoxine deficiency might have the same effect as a deficiency of unsaturated fatty acid.

The fact is that the basic problem is not lipemia, hypercholesteremia, or hepatic lipid excess, but it is atheromatosis and, in particular, myocardial infarction. Atheromas have not been described or associated clinically or experimentally with fatty acid deficiency. With the exception of Hartroft and Thomas' [10] recent

production of myocardial infarction in animals on certain dietary regimens high in fat, myocardial infarction has not been precipitated in animals by excessive intake of any particular fat or of cholesterol or by a deficiency of pyridoxine or any unsaturated fatty acid.

Fat and Clotting

The hypothetical sequence in vogue, since the time of Virchow, from hypercholesteremia to increased intimal lipid deposition ending in atheroma has been questioned. Duguid [11] has restated the Rokitansky concept that atheroma begins in deposition of fibrin and extends by incorporation and organization of these deposits. The bridge between this view and that which associates atherogenesis with lipemia is provided by experiments which show that lipemic blood may hasten coagulation in vitro or shorten plasma clotting time induced by an incomplete thromboplastin.

Proteins

Dietary proteins may also be involved in experimental atherosclerosis. The production of atherosclerosis in the monkey was accomplished by means of diets containing alpha protein and was prevented when casein was the dietary protein. Other studies with rats showed that the hypercholesteremic response varied according to the protein level. The lowest response was observed among those animals receiving the highest level of dietary protein. Since atherosclerosis in man is associated with an abundant diet, it is difficult to believe that diets low in protein or low in essential amino acids can be a causative factor.

The American Diet

Has there been a marked change in the American diet during the past one or two generations—a period in which the incidence of coronary heart disease and atherosclerosis may have increased?

Katz [12] states unequivocally that the fat content of the American diet has increased. To prove this point, he cites data from the Department of Agriculture going back to 1910. But these data are concerned with food estimated to be available at the retail level and are really no true measure of the actual food consumed. The tremendous fat collections from kitchens during the war years are an indication of the degree of the loss.

The second method of estimating food consumption is the dietary survey. Many studies ranging from approximately 1900 to the present day show a considerable variation in dietary intake, depending on the group and area under scrutiny. However, variation with time is not very striking.

It is true that the use of hydrogenated fats has increased. Thirty years ago these processed fats were relatively new products. However, the proportion of animal and vegetable fats in the diet has remained relatively constant. It might be pointed out that an increase in the consumption of hydrogenated fats during the past 25 to 30 years does not necessarily mean a decrease in the intake of the so-called essential fatty acids. The following are reasons for this:

1. Although the use of hydrogenated vegetable oils has increased over the past several years, so too has the use of these same oils in their natural state. This latter use represents a substantial contribution of "essential" unsaturated fatty acids.

2. Gross measurements of changes of saturation induced by hydrogenation do not necessarily indicate the degree of change in the content of biologically active linoleic and linolenic acids. During hydrogenation the content of normal linoleate of an oil, while reduced, is not abolished.

McCann and Trulson [13] have recently estimated the intake of "essential" fatty acids in current and past American diets and comment as follows: "However, there has been no marked change in the total amount of essential unsaturated fatty acids in the American diet over the past half century. The increased saturation of fats induced by the hydrogenation of shortenings and margarines has been balanced by an increased consumption of 'other fats and oils,' fats which are mostly unsaturated and have a high content of essential fatty acids."

General Comment

One can summarize the hypotheses presented as follows: 1. Diet may play an important role in the pathogenesis of atherosclerosis. 2. The fat content and the total calories in the diet are probably important factors. 3. The type of fat, rather than the total fat or the ration or balance between the saturated and certain unsaturated fats, may be the basic determinant. 4. The proposition that the character of the American diet has so changed during the past 50 years as to increase the incidence of coronary vascular disease has not been supported. 5. Other aspects of fat metabolism may be determinants. 6. A wide variety of other factors, dietary and nondietary, may be of equal or greater importance. 7. Myocardial infarction, the real crux of the problem, has been only recently, and, on a complicated dietary regimen, produced experimentally, despite the extensive and severe atherosclerosis that has been produced.

It should be realized that these conclusions are subject to some very basic criticisms. One is that most of the studies have focused attention on the concentrations of serum cholesterol, serum lipid, or serum lipoprotein without proper emphasis on the focus of the problem, which is atheroma and infarction. Is there compelling evidence that, if we treat to adjust the serum cholesterol concentration, we are doing anything to lessen the chances of coronary infarction? Perhaps the best that can be said is that there is an association which has statistical value but that it is not an obligatory association either in small groups or, much less, in an individual.

Even if one accepts the equation that hypercholesteremia leads to atherosclerosis (or some variant thereof), the fact is that serum lipid concentrations (perhaps more in some people than in others) show considerable "spontaneous" fluctuations which makes the application of the formula difficult. Variations of

serum lipid concentrations among individuals of the same sex and age who consume similar diets are also great. Consequently, data based on single determinations are potentially highly inaccurate, and control data by repeated observation on standard regimens should be secured over several weeks.

Vital statistics, particularly those from countries with different methods of reporting, understaffed health departments, and low autopsy rates are very apt to be misleading. The diagnostic accuracy of all physicians is not equal, and standards vary from place to place. Diet histories are time-consuming and, at best, yield data which are only moderately accurate. When data are obtained through interpreters and when good rapport has not been possible, they lose even this limited value. A national diet, low in fat, is usually also low in sucrose and animal protein; it is usually high in fiber and starch, and the vitamin and mineral content may differ from American diets.

Finally, there are other common factors in human life which are atherogenic but are not related to lipemia. Of these, the most common and best documented is arterial hypertension. This association is well recognized. The greatest frequency of complications of atherosclerosis, fatal and nonfatal, was found in a group of patients whose severe hypertensive disease had been brought under some control with antipressor drugs. Among these persons, such complications occurred three times as often in those with high diastolic pressures (greater than 110 mm. Hg) as in those with lower average pressure. In the severely hypertensive patients, there was no demonstrable association between the incidence of these complications and the levels of serum cholesterol or of the light or dense lipoprotein fractions.

Conclusions

Atherosclerosis and myocardial infarction are diseases in which numerous factors are involved, including diet. Diet and nutrition are important factors in experimental atherosclerosis and, very probably, in the human form of the disease. Thrombosis and infarction are probably more likely to occur in arteries severely sclerosed.

The evidence at hand suggests a general association with high rates of consumption of fat, but it is difficult to disentangle this from caloric balance, exercise, changes in body weight, and other metabolic and dietary factors that may be involved. Thus, the present evidence does not convey any specific implications for drastic dietary change, specifically in the quantity or type of fat in the diet of the general population, on the premise that such changes will definitely lessen the incidence of coronary artery disease. On the other hand, the fact that obesity is a nutritional failure caused by consuming more calories than one expends and the fact that dietary fats are the most concentrated source of calories, providing some 40 to 45% of the daily caloric intake, suggests that many persons should consume fewer calories. For most, this will mean eating less fat.

Prudence, as well as habit and taste, will dictate the selection of a diet containing some fat. Diets providing 25 to 30% of the calories from fat, rather than the current 40 to 45% in the American diet, can still provide palatable meals for our accustomed tastes.

The key points of nutritional common sense for better health generally, and most likely in regard to atherosclerosis specifically, consist of a balanced, varied diet which adjusts total calories to reach or maintain a desirable weight, and which provides less fat, more protein from lean meat, fish, poultry, and cereals, and a reasonable selection of fruits and vegetables, as well as animal foods.

The aforementioned conclusions obviously apply to the general population and not to patients or to individuals with a family history of early deaths from cardiovascular disease nor to those who are being followed up with some regularity by their physician. The newer concepts of nutrition readily suggest various types of diet therapy which may prove useful to certain patients. Investigative procedures of this type, together with continued basic research, will, in time, provide the facts upon which dietary recommendations may in the future be made to the public at large and which may help in lessening the prevalence of coronary thrombosis.

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REVIVING THE SURVIVORS

Each year an estimated 250,000 Americans become sufficiently disabled to require rehabilitation services. Along with our increased population and longevity, we see more congenital malformations, more chronic illnesses, and more crippling conditions from accidents. Yet there are at least two million physically handicapped adults who could be rehabilitated to the point of gainful employment.

That picture presents a staggering view of the future: Unless something is done about using the disabled, in the next generation there will be a drag of one chronically ill person, one physically handicapped person, or one unproductive oldster economically saddled upon every American worker who is able-bodied. Such a prospect creates a high priority challenge to management, labor, and government—to every thinking citizen—because it foreshadows a socioeconomic crisis of first magnitude. It is an even sharper challenge to the medical community, because no amount of big spending or good intentions can enable the disabled to be useful and happy again unless comprehensive medical action and planning is called into play with the efforts of interested lay groups and individuals.

It is precisely because rehabilitation demands such universal concern—the concern of all physicians—that the American Medical Association's Board of Trustees last year established a committee drawn from five A. M. A. Councils: Industrial Health, Mental Health, Medical Physics, Medical Service, and Medical Education and Hospitals. This Committee on Rehabilitation is presenting its first report on page 2045 of this issue of THE JOURNAL. It emphasizes that "every individual physician can and should assume responsibility for the rehabilitation of his patients" by directing them to the proper specialized medical and other services in the community. This, in turn, offers county medical societies the opportunity to perform another service for their members: Listing of the various medical, social, and educational agencies which provide help to the disabled person within the community.

The A. M. A. committee sees rehabilitation as a total problem requiring total participation of our culture's diverse forces, including medicine, education, and sociology. But in this concept of totality, the committee goes on to say, "the physician should take the lead and direct the rehabilitation team if the important, traditional physician-patient relationship is to be maintained and his patients are to receive all the benefits total rehabilitation has to offer."

Indeed, there are great benefits, as evidenced by effective rehabilitation programs carried on by some universities, businesses, foundations, and other institutions—all via medical direction. The University of Minnesota's Rehabilitation Center, for example, uses the resources of several hospitals, the graduate medical school, research laboratories, and Minneapolis-area industry to return, little by little in a comprehensively planned program, the disabled to self-sufficiency in outlook, home life, and employment. Each new activity, mastered with medical supervision, becomes a part of the patient's much-needed independence when he is ready to go home.

Success also is being achieved by the Liberty Mutual Insurance Company in a cooperative hospital service and two rehabilitation centers in Chicago and Boston. Under the totality concept of rehabilitation, every patient receives the benefit of correct medical diagnosis, early treatment, steady care by a team of rehabilitation experts, and follow-up help by vocational training specialists. The insurance company reported: "Costs of rehabilitation are more than matched by the dollar savings achieved. . . . [Our] philosophy is to go beyond treatment of the disability itself, to draw upon all of modern medicine's vast resources . . . to the point of seeing the patient not only healed but fully functioning in our society."

In Peoria, Ill., the Institute of Physical Medicine and Rehabilitation functions in two hospitals, where medical care, social service, speech therapy, psychological testing, and job placement are combined in facilities which formerly were available only in scattered big-city locations.

Such a grasp of the nation's rehabilitation problem—an understanding, to begin with, that it is a many-faceted problem best solved in the home community—is being made elsewhere in the United States. Exercised extensively with proper medical initiative, this grasp can help turn an enormously wasteful liability into a total asset. It can enable our disabled not merely to survive but to revive.

A study of disabled individuals rehabilitated through rehabilitation programs reveals that 80 to 85% of the rehabilitants continue to work, are in the same or a better job, and increase their earnings just as other workers do. Studies also have shown that handicapped workers are adaptable, productive, careful, regular, reliable, and capable. This pool of talent would go far to meet the increasing demands for skilled and unskilled employees in American industry. In addition, it would mean savings in public assistance payments of hundreds of millions of dollars. Considering that it is now costing the public more than 500 million dollars annually to provide maintenance and medical care for the disabled through public assistance programs, this item is not insignificant for the taxpayer. Perhaps of greater importance, however, is the role which the rehabilitated person can assume as a public-spirited citizen and as a happy employee.

THE PRESIDENT'S PAGE

A MONTHLY MESSAGE

Two disturbing suggestions that could cloud the future of voluntary health insurance in the United States are getting strong support. They are the proposed Social Security amendment to provide 60 days of free hospitalization for beneficiaries 65 years of age and over and the insistence of certain labor groups on comprehensive coverage which will pay all medical care bills.

Already the American Medical Association is on record as actively opposed to the 60-day-hospitalization amendment. Like other recent Social Security amendments, the latest proposal is another in a line of piecemeal steps toward government control of medicine. Although proclaimed as a measure to solve the hospitalization problem for older folks, it is actually a political move to capture votes—quite naturally planned for 1958, a congressional election year.

I admit there is a problem of finding ways to provide voluntary health insurance for persons over 65. Although thousands who reach age 65 may continue as members of medical care plans, some plans arbitrarily drop older persons from the rolls and others reduce their benefits. Too, a few plans often refuse enrollment to older people. Efforts, however, are being made to resolve the issue. I believe there are some promising experiments in progress. For example, medical societies and others are testing "over 65" contracts and preretirement financing of health insurance for insured persons.

Even though there are 118 million Americans covered by some form of voluntary health insurance and 25% of the medical bills are paid from health insurance funds, we know new plans can be devised to cover more Americans and to offer needed benefits. The various experiments now in progress are testimony to the desire of medicine and its allies to provide the best possible plans for the individual.

We are close to some excellent solutions to the problem of voluntary health insurance for the retired. However, these plans could be nullified by a government scheme of 60 days' free hospitalization. If they are, the whole structure of voluntary health insurance will be weakened and, I believe, will be in danger of being "gobbled up" by new and greater extensions of the government into the health insurance field.

The other suggestion that could do irreparable damage to, or perhaps destroy, voluntary health insurance is the insistence by some labor unions on full payment for complete medical care on an insurance basis. It is folly to think that insurance plans could pay all bills for all medical care of every insured individual. Health insurance was never meant to relieve the insured person from any individual responsibility for financing his health care costs. It was meant to improve his ability to pay for medical care needed.

Under the suggested full-payment scheme there would be no built-in controls on utilization, for the insured person would have no real interest in the bills he contracted. Consequently, the demand for benefits would be uncontrollable and costs would be infinite. It is my opinion that no one must expect of insurance those goals which are unrealistic. And full payment for all medical bills is unrealistic.

Thus, I believe that the 60-day-free-hospitalization plan and the full-payment plan for all medical bills are undesirable proposals. They do not provide reasonable financing mechanisms for paying for health care costs. In the government proposal the financing mechanism is a direct step toward the socialization of our economy.

In the labor suggestion the demands are so great as to make voluntary health insurance economically unsound. Thus, voluntary health insurance would appear undesirable or unequal to the task, and the idea of complete government control of all health insurance thereby fostered.

Medicine has a duty to oppose such unsound schemes. It has the great responsibilty of experimenting and encouraging as broad a coverage as possible within the limits of actuarial soundness. It also has the job of resisting demands of patients for unnecessary hospitalization and treatment.

No one is in a better position than the doctor to help the cause of voluntary health insurance, and to promote better medical attention for more Americans while maintaining a free medical profession. If we fail to grasp this opportunity we will do the insurance industry, our patients, and our profession a serious disservice.

DAVID B. ALLMAN, M.D., Atlantic City, N. J.

ORGANIZATION SECTION

FEDERAL MEDICAL LEGISLATION

First Session, 85th Congress

Public Health Training and Services

Senator Humphrey (D., Minn.), in S. 2304, would "amend the Public Health Service Act to provide an emergency five-year program of grants and scholarships for post-graduate education in the field of public health." He would authorize the appropriation of 1 million dollars annually, for five years, for subsidies to maintain and increase enrollments in schools of public health. A school could receive 15% of the basic operating costs of graduate instruction plus $500 for each full-time student in excess of the average past enrollment, plus $500 for each student enrolled in excess of 30 students. He would authorize also the appropriation of 1 million dollars for five years for construction and equipment of schools of public health, but grants could not exceed 50% of the total cost. The bill also contains an authorization for $250,000 annually for scholarships for a period of six years. This bill was referred to the Committee on Labor and Public Welfare.

Representative Rhodes (D., Pa.), in H. R. 6771, proposes to earmark, from funds already authorized, "an amount, not to exceed $1,000,000, to enable the Surgeon General to make grants-in-aid, under such terms and conditions as may be prescribed by regulations, for the support of public or nonprofit educational institutions which provide comprehensive professional training, specialized consultative services, and technical assistance in the fields of public health and in the administration of State and local public health programs." This measure was referred to the Interstate and Foreign Commerce Committee.

Grades of Major General and Brigadier General in the Medical Corps

Representative Durham (D., N. C.) has introduced, in H. R. 6801, a measure which would authorize the appointment of general officers in the Medical Service Corps, one of whom would be the chief of the Medical Service Corps, with the rank of major general. The appointment of two other major generals and two brigadier generals would also be authorized. This bill was referred to the Committee on Armed Services.

Federal Aid for Medical Schools and Research

Senator Smith (R., N. J.), for himself and Senator Purtell (R., Conn.), in S. 1917, and Representatives Harris (R., Ark.), in H. R. 6874, and Wolverton (R., N. J.), in H. R. 6875, have introduced identical measures which would amend the administration bill for authorizations of federal funds for five years to aid in the construction of medical school facilities. The bill would also extend the federal aid program for construction of research facilities two additional years. Thus, the two programs would terminate at the same time. They would authorize the appropriation of a total of 225 million dollars over the five-year period. Up to 30 million dollars of this would be used for the construction of dental teaching and research facilities.

Grants under this measure would not be given if the building were to be a hospital, diagnostic or treatment center, rehabilitation facility, or nursing home, as defined in the Hill-Burton act. However, schools of osteopathy or public health would be eligible for grants in the same manner as schools of medicine and dentistry. The measure specifically states that neither the federal government nor any of its officials shall interfere with the personnel, curriculum, methods of instruction, or administration of any institution. A National Advisory Council established under the Health Research Facilities law would be advisory to the federal government in the combined program. The House measures were referred to the Interstate and Foreign Commerce Committee. The Senate measure was referred to the Labor and Public Welfare Committee.

Senators Hill (D., Ala.), Kennedy (D., Mass.), Neely (D., W. Va.), Humphrey (D., Minn.), and Smathers (D., Fla.), have introduced, in S. 1922, a bill "to authorize a five-year program of grants for construction of medical and dental educational and research facilities." They would authorize the appropriation of 60 million dollars annually with 52 million a year marked for medical schools and 8 million for dental schools. The federal contribution toward construction could not exceed 50%, except in the case of existing schools which agree to increase the freshman enrollment 5% over the 1956-1957 freshman enrollment. In this case the federal grants could equal 66.6% for the cost of construction as for new schools. Schools of osteopathy would also be eligible for such grants.

No grant or grants could be made to any one medical school in excess of 3 million dollars or in excess of 1 million dollars for any one dental school. Up to 20% of the amount of any grant for any construction could, at the discretion of the applicant, be allocated to permanent endowment for maintenance of the new facility. The bill provides for a Federal Council for Medical and Dental Educational Facilities to assist the surgeon general. This measure was referred to the Committee on Labor and Public Welfare.

Representative Fogarty (D., R. I.) has introduced a similar bill, in H. R. 7841, except that the bill would authorize 45 million dollars annually for medical schools, 7 million for public health schools, and 8 million for dental schools and would limit the federal

From the Washington Office of the American Medical Association.

grants to 3 million dollars for any one medical school, 1 million dollars for a public health school, and 1 million dollars for a dental school. This measure was referred to the Interstate and Foreign Commerce Committee.

Trustees for Welfare Funds

Senator Goldwater (R., Ariz.) proposes, in S. 1813, to amend the National Labor Relations act to require the appointment of three trustees for welfare funds for workers. One trustee would be named by the employer and one by the employees. A third trustee would be appointed by the United States district court judge for the district where the fund has its principal office. An audit would have to be made by a certified public accountant and filed with the Securities Exchange Commission and would also have to be open to public inspection. No officer or employee or member of the fund could borrow from the fund nor share in any commission or brokerage fee paid for insurance. The employer could make payments to a welfare fund of his employees only after he had received from each employee, on whose account deductions are to be made, a written assignment effective for not more than one year or the period of an applicable collective bargaining agreement. This measure was referred to the Committee on Labor and Public Welfare.

Presumption of Service Connection for Convulsions and Meningitis

Representative Granahan (D., Pa.), in H. R. 6984, proposes to amend the Veterans Regulations to provide "that idiopathic convulsive seizures manifesting a 10 per centum degree of disability or more within six months from the date of separation from active service shall be conclusively presumed to have been incurred in or aggravated by active service."

Representative Teague (D., Texas), in H. R. 7573, would provide "that meningitis developing a 10 per centum or more degree of disability within one year after separation from active service shall be presumed to be service connected." Both measures were referred to the Veterans' Affairs Committee.

Water Pollution Control Act Amendments

Representative Hiestand (R., Calif.), in H. R. 7156, has introduced a bill to amend the Water Pollution Control Act to repeal (1) that section which authorizes the federal government to make available 3 million dollars in grants to states for establishing and maintaining adequate measures for the prevention and control of water pollution; and (2) that section under which the federal government would be authorized to make grants for water treatment plants up to a total of 500 million dollars over a period of 10 years. This measure was referred to the Committee on Public Works.

Federal Advisory Council on Health

Representative Wainwright (R., N. Y.), in H. R. 7171, and Senator Smith (R., N. J.), in S. 2293, have introduced similar measures based upon the recommendations of the Commission on Organization of the Executive Branch of the Government. These measures would establish a Federal Advisory Council on Health "to evaluate and advise on reorganizing the conduct of the several medical programs in respects necessary to achieve a maximum of economy and to eliminate duplications of efforts and competition among the several departments and agencies." The House measure was referred to the Interstate and Foreign Commerce Committee and the Senate bill to the Committee on Labor and Public Welfare.

Health Insurance for Civilian Federal Employees

Representative O'Hara (D., Ill.) has introduced, in H. R. 7581, an identical measure to that of Representative Lesinski (D., Mich.), H. R. 753, and Representative Shelley (D., Calif.), H. R. 4700, previously reported. These bills would provide for withholding 50% of the cost of health insurance from the employee's salary. The federal government would contribute 50% of the cost. The government contribution would cease when the employee's salary payments cease. However, if an employee retires on an annuity with 15 years or more of service, or is retired for disability, the federal government would pay the total cost of the plans. An advisory board of federal employees or employee representatives would advise the chairman of the Civil Service Commission of the administration on the proposed law. This bill was referred to the Committee on Post Office and Civil Service.

Senator Scott (D., N. C.) has introduced, in S. 2357, a bill identical to H. R. 7034, by Representative Holifield (D., Calif.), previously reported. This bill was drafted by the American Hospital Association. The cost of health insurance would be borne by the employees and by the government for both basic and major medical coverage. Coverage would be voluntary on the part of the employees. The employees' share would be paid through payroll deductions. The contribution of the federal government could not exceed $1 biweekly for an employee, or $2.50 biweekly for the employee and his dependents. The types of insurance from which the employee could choose would be (1) a plan for basic health benefits on a service basis and, if elected, major medical benefits as well through the same carrier; (2) basic benefits on an indemnity basis and, if elected, major medical as well; (3) a group plan of hospital, surgical, or medical benefits or any combination of such services provided by a national association of federal employees; (4) a group practice prepayment plan approved by the Civil Service Commission. Employees retired after Dec. 31, 1957, receiving an annuity could enroll in the plan at the same charge as other employees in their locality. Survivors of the employees could also elect coverage at the same rates. This bill was referred to the Post Office and Civil Service Committee.

Senator Johnston (D., S. C.), for himself, and Senator Carlson (R., Kan.), in S. 2339, and Representative Rees (R., Kan.), in H. R. 8299, have introduced the admin-

istration's bill to "provide federal contributions and authorize payroll deductions for prepaid health insurance for federal employees and their dependents." The insurance program would be a voluntary one with payroll deductions but employees must take both basic coverage and catastrophic or major medical coverage. The basic health insurance plan must (1) offer coverage at group rates; (2) must not discriminate because of race, sex, or hazardous employment; (3) must accept enrollment regardless of age, or physical condition; (4) must not object to the federal employee being transferred from one agency to another; (5) must agree that an employee or his dependents shall have the right to continue coverage upon separation or retirement of the employee at rates not in excess of similar plans; (6) must furnish the employee a policy or certificate; (7) must not reduce benefits or increase premiums because of age; (8) must not exclude payment of benefits for preexisting physical conditions, except pregnancy existing on the effective date of coverage.

The major medical insurance would pay 75% of covered hospital expenses after the first 70 days of hospitalization (the basic plan presumably would cover the first 70 days). Benefits would also include 75% of medical costs not covered by the basic plan after a $100 deductible payment by the employee. Benefits under major medical coverage would be limited to $5,000 in any one calendar year and $10,000 in a lifetime. Federal employees 65 years of age and retired employees could continue their major medical insurance plans with or without basic health insurance, and the federal government would continue making contributions toward the major medical insurance but not the cost of basic coverage after retirement. The government contribution for basic health insurance would be one-third of the premium up to 50 cents biweekly for the employee or $1.50 for the employee and one or more dependents. For major medical coverage the government would contribute one-third or 12½ cents biweekly for single employees and 37½ cents for employees with dependents. Both measures were referred to the Post Office and Civil Service Committee.

Tax Deferment for Self-Employed

Representative Latham (R., N. Y.), in H. R. 7675, proposes to amend the Internal Revenue Code so that taxpayers may deduct from adjusted gross income in calculating income tax the cost of retirement plans up to a maximum of 5% of such income or $3,000 annually, whichever is less. Employed persons who are covered under a pension or profit-sharing plan could deduct only 2.5% of earned adjusted income or $3,000 annually, whichever is less. More liberal deductions are permitted for persons between 50 and 70 years of age. Payments from the retirement fund could not be collected until the taxpayer attains 65 years of age or unless he becomes totally and permanently disabled prior to such age.

Representatives Dooley (R., N. Y.), in H. R. 7868, Hemphill (D., S. C.), in H. R. 7874, and Flood (D., Pa.) have introduced measures identical to H. R. 9 by Jenkins (R., Ohio) and H. R. 10 by Keogh (D., N. Y.), previously reported. These would permit the self-employed taxpayer to deduct from his adjusted gross income on account of retirement plan costs a maximum of 10% of his net earnings or $5,000 annually, whichever is less, and could not exceed $100,000 during a taxpayer's lifetime. Between 50 and 70 years of age, an additional 10% could be deducted for each year over 50. Periodic payments made to the taxpayer from the fund after 65 years of age would be treated as ordinary income for tax purposes. For earlier take down or surrender for cash, an adjusted tax would be paid. All these measures were referred to the Ways and Means Committee.

Public Assistance Amendments

Representatives McGovern (D., S. D.), in H. R. 7703, O'Hara (D., Ill.), in H. R. 7879, and Bowler (D., Ill.), in H. R. 7951, have introduced measures identical to a series of bills previously reported, amending the public assistance provisions of the Social Security Act to make more uniform state laws regarding standards of qualification for applicants and recipients of federal-state public assistance. The changes in the present law would be (1) make the age requirements for old-age assistance recipients the same as that established for old-age beneficiaries of the social security "insurance" system, i. e., 62 years for women and 65 years for men; (2) allow aged and handicapped recipients to earn up to $50 per month and still draw maximum assistance benefits; (3) parents of needy children could earn up to $30 as could needy children (blind recipients are already permitted to earn $50 per month without penalty of reduction in assistance aid); (4) real property up to $5,000 could be owned without loss of assistance aid, nor would ownership of personal effects up to $1,200 and household furnishings and insurance policies up to $500 of value diminish assistance payments; (5) names of public assistance recipients would be held confidential; (6) residence requirements could not be imposed on any public assistance applicant providing he lived in the state for as long as one year. All the above measures were referred to the Ways and Means Committee.

Hill-Burton Hospital Construction

Representative Anderson (D., Mont.) proposes, in H. R. 8053, to authorize funds which are available for construction of Indian health facilities to be used to assist in the construction of community hospitals, which are defined to include diagnostic or treatment centers, and which also will serve Indians and non-Indians. The surgeon general of the Public Health Service could furnish federal funds for construction of that portion of a community health facility devoted to the care of Indians. The project sponsor would be required to furnish its normal share as under the Hill-Burton program for that portion of the hospital or diag-

nostic or treatment center not devoted to the care of Indians. A diagnostic or treatment center is defined as "a facility for the diagnosis or diagnosis and treatment of ambulatory patients—(1) which is operated in connection with a hospital, or (2) in which patient care is under the professional supervision of persons licensed to practice medicine or surgery in the State, or, in the case of dental diagnosis or treatment, under the professional supervision of persons licensed to practice dentistry in the State."

This bill was written in the Department of Health, Education, and Welfare. It was referred to the Interstate and Foreign Commerce Committee and promptly reported out favorably and passed by the House of Representatives.

Representative Knutson (D., Minn.) has introduced, in H. R. 7741, a measure which would extend the Hospital Survey and Construction Act, for three additional years through June 30, 1962. This bill is identical to S. 1487 by Senator Humphrey (D., Minn.), previously reported. This measure was referred to the Interstate and Foreign Commerce Committee.

Representative Neal (R., W. Va.), in H. R. 8026, would continue to make available funds for surveys and planning under the amended Hill-Burton Hospital Construction Act. This is to apply to the 1954 amendment authorizing grants for diagnostic or treatment centers, hospitals for the chronically ill, rehabilitation facilities, and nursing homes. Under the Neal bill they would be allowed two additional years through June 30, 1959, to utilize the funds allotted to the states for such surveys and planning. The extension which was sought by this bill was accepted in part with the enactment of the appropriation bill for the Department of Health, Education, and Welfare. The provision in the appropriation act, however, extended authorization for the states to utilize allocated but unspent funds until June 30, 1958. This measure was referred to the Committee on Appropriations.

Agency for the Handicapped

Representative Diggs (D., Mich.), in H. R. 7799, has introduced a measure which would establish a Federal Agency for the Handicapped to which would be transferred all the present functions of the Office of Vocational Rehabilitation from the Department of Health, Education, and Welfare and several of the functions of the Department of Labor. He would establish also a Division for the Handicapped in the United States Civil Service Commission to give assistance to handicapped persons in procuring federal employment, and would establish in the Department of Labor a Committee for the Training and Development of Placement Personnel. This bill was referred to the Committee on Education and Labor.

Social Security

Public Assistance for All Needy Persons.—Representative Forand (D., R. I.), in H. R. 7831, would amend the Social Security Act to provide public assistance in the form of money payments or medical care to all needy persons. The federal share would not be more than 80% of the total expenditures, depending upon the wealth, per capita, of each state. The secretary of the Department of Health, Education, and Welfare would be authorized to establish within the Social Security Administration an Office of Public Welfare to administer the program.

Disability Benefits for Widows at Age 50.—Representative Shelley (D., Calif.), in H. R. 7834, would amend the Social Security Act to provide a widows' insurance benefits to a disabled widow 50 years of age instead of 62 years as is now provided in this law. These measures were referred to the Committee on Ways and Means.

Lobbying Act Amendment

Senator McClellan (D., Ark.), for himself and Senators Bridges (R., N. H.); Anderson (D., N. Mex.); Purtell (R., Conn.); Gore (D., Tenn.); Thye (R., Minn.); Kennedy (D., Mass.); and Goldwater (R., Ariz.), has introduced, in S. 2191, a measure to amend the Legislative Reorganization Act of 1946, which requires the registration of lobbyists. The administration of the act would be by the comptroller general of the United States, who would receive the registrations and police activities of lobbyists and report violations to the United States Attorney General. The legislative persons subject to the Act are (*a*) legislative agents; (*b*) employers of legislative agents; and (*c*) persons or organizations who write to more than 1,000 persons asking them to communicate with Congress or make expenditures exceeding $50,000 in a year in presenting a program to the public, part of which is calculated to influence legislation. A legislative agent is defined as "any person who, for any consideration, is employed or retained to influence legislation, in person or through any other person, by means of direct communication." The employer of a legislative agency who spends $300 or more in any calendar quarter to influence legislation must also register. This measure was referred to the Committee on Government Operations.

Representative Hyde (R., Md.), in H. R. 8346, has introduced a similar measure but it would broaden the term lobbying to include communication with officers and employees of Congress, as well as members of Congress. This measure was referred to the Judiciary Committee.

Vocational Rehabilitation Act Amendment

Senator Magnuson (D., Wash.), in S. 2254, and Representative Wright (D., Texas), in H. R. 8429, proposes to extend the authority for grants to states and public and nonprofit organizations and agencies for planning, preparing, and initiating a substantial nationwide expansion of vocational rehabilitation programs in the states. This authority was to end June 30, 1957, under the existing law. Representative Wright would extend it to June 30, 1958, and Senator Magnuson would extend it indefinitely. The House measure

was referred to the Committee on Education and Labor and the Senate bill was referred to the Labor and Public Welfare Committee.

Tax Deductions

For Rest Home Care.—Representative Ashley (D., Ohio), in H. R. 8093, has introduced measure identical to S. 1275, introduced by Senators Murray and Mansfield, (D., Mont.), previously reported. They would allow in computing the income tax deduction from the adjusted gross income of "amounts paid for the institutional care of a disabled person to be deducted as medical expenses. . . . The term 'medical care' also means amounts paid to an institution for the care (including board and lodging) and supervision of an individual who is disabled and who is in such institution because of his need for continual personal attention. For purposes of this paragraph, an individual shall be considered to be disabled only if he is unable to engage in any substantially gainful activity by reason of age or of any medically determinable physical or mental impairment which can be expected to be of indefinite or long-continued duration."

Medical Expense Deduction.—Representative Wharton (R., N. Y.), in H. R. 8253, would amend the Internal Revenue Code "to remove the existing maximum limitations on the amount of the deduction for medical expenses" and would permit the deduction of all medical expenses over 3% of the adjusted gross income in calculating income tax. Both measures were referred to the Ways and Means Committee.

Food Additives

Representative Teller (D., N. Y.), by H. Res. 273, would establish a select committee of 10 members of the House of Representatives "to conduct a full and complete investigation and study of the use of chemicals and other additives in food, medicine, and beverages, with a view to ascertaining what deleterious effects such chemicals and additives have on human life and health." This bill was referred to the Rules Committee.

Representative Harris (D., Ark.), in H. R. 8390, would amend "the federal Food, Drug, and Cosmetic Act to prohibit the use in food of additives which have not been adequately tested to establish their safety. . . . The pretesting data on such additives must have been fully submitted to the Secretary" for evaluation before the additive could be used. The use of the additive could then be stopped by court injunction.

Representative Miller (R., Neb.) has introduced a similar measure, in H. R. 8112. Both measures were referred to the Interstate and Foreign Commerce Committee.

Longshoremen and Harbor Workers' Compensation Act Amendment

Senator Magnuson (D., Wash.) in S. 2400, would "amend the Longshoremen's and Harbor Workers' Compensation Act, so as to provide that an injured employee shall have the right to select his own physician." This amendment is identical to H. R. 7303, introduced by Representative Roosevelt (D., Calif.), and reported previously in detail. The injured employee could select the physician and hospital of his choice. However, if the employer believed that the care being rendered is not adequate, an application could be filed with the commissioner to obtain an order authorizing treatment by another physician. The employer could have the claimant examined by a physician of the employer's choice. This measure was referred to the Committee on Labor and Public Welfare.

Treaties and International Agreements

Representative Mason (R., Ill.), in H. J. Res. 375, proposes an amendment to the Constitution relating the legal effect of treaties and international agreements. The essential provisions are "that no treaty shall have greater effect within the United States than if it were a law of the United States, and any international agreement, other than a treaty, shall have effect within the United States only to the extent provided by a law of the United States."

Executive agreements to become effective as domestic law would have to be implemented by a law passed by both branches of Congress. This bill was referred to the Judiciary Committee.

JOURNAL INDEX

The index to volume 164 of THE JOURNAL will appear in the Sept. 14 issue. Those who wish extra copies of the index may receive them, without charge, on request to the Order Department, American Medical Association, 535 N. Dearborn St., Chicago 10.

COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

NOTES FROM THE COUNCIL

Election of Officers

Dr. Leland S. McKittrick was elected Chairman of the Council to succeed Dr. H. G. Weiskotten, who retired. Dr. James M. Faulkner was elected Vice-chairman.

Newly Approved Four-Year Medical Schools

During the course of the academic year 1956-1957, the medical schools of the universities of Mississippi, Missouri, and Saskatchewan initiated full four-year educational programs. Survey of these institutions by the Council on Medical Education and Hospitals and the Association of American Medical Colleges resulted in their being granted approval. All three schools had previously offered and been approved for two-year programs in the basic medical sciences.

COUNCIL ON MEDICAL SERVICE

STRESS AND EXHAUSTION

Edward L. Bortz, M.D., Philadelphia

This is the second of a series of papers on various aspects of aging. Each paper has been prepared for the Committee on Aging by an authority in the field. When completed, the series will be published in booklet form.

Resistance to disease becomes progressively less with increasing age. Older individuals are killed by diseases which would not have destroyed them when they were young. It has been stated by Alex Comfort that, had we throughout life the same resistance to stress and disease as we had at the age of 10, about half of us might expect to live approximately 700 years. The object of studying the changes that occur with aging is to find out why they occur and what can be done about them.

Many of the changes which take place in the body and nervous system are susceptible of reasonably exact measurement. There is dispersion of energy with the passage of time. This results in structural and functional alterations which are the measure of rate of aging. When a tissue retains its ability to maintain optimum structure for function, the rate of physiological aging may be kept at a minimum. As toxic agents and adverse environmental influences bring about a lessening of the vitality of the tissues, the rate of aging is accelerated.

The aphorism "adapt or perish" emphasizes Hans Selye's suggestion that adaptability is the most distinctive characteristic of human existence. Adaptation to stress is a gradual building up of resistance of the tissues to adverse factors. Loss of ability to adapt is an indication of aging. There are exquisite mechanisms within the body whereby it is able to neutralize the various shocks. It can adapt to a wide variety of conditions. Under a normal healthy state of affairs, a minimum of wear and tear and deterioration of body tissues and function occurs. Insofar as an organ has adequate reserve, it can withstand ordinary assaults which would dissipate that reserve. Following the recovery period in the adaptive process, the body reserve returns to normal.

Selye [1] reviews, in a recent article, the various concepts bearing on the syndrome which he identifies as the stress syndrome. He defines stress as a state manifested by a specific syndrome which consists of all the nonspecifically induced changes within the body. The stress syndrome has a specific form even though it is nonspecifically induced. The syndrome affects the whole body while the local stress syndrome influences several units within a part. However, stress always manifests itself by a syndrome, that is, by the sum of the changes and not by any one particular change. It is essential to understand that a specific stimulus acting only on one organ usually causes a less marked stress response than a nonspecific agent which acts in many parts of the body. For example: Selye points out that exhaustive stimulation or even complete destruction of a limited cell group is much less effective in causing a corticotropin (ACTH) discharge than is a moderate stimulation of a more extensive area. The magnitude of the stress manifestation, that is, the corticotropin discharge, appears to depend upon the sum of all the reactions which occur in the body at any one time. There must be a common pathway somewhere in response to stress. These facts are important in understanding the reaction to long-continued stress states which may produce eventual alterations in structure.

Exhaustion may result from physical and emotional strain or from the innumerable vexations and torments of modern times. Identification of the most common causes that bring about exhaustion is helpful. These may be identified as the various illnesses, functional disturbances, organic diseases, abnormal mental attitudes, and many other conditions. It is important to realize that the body can neutralize the wasting of its reserve if given adequate assistance.

The wear and tear reactions in the body are reflected in the variations of function which revolve around the pituitary-adrenal axis. For example, 17-ketosteroid output is lowered in chronic illness, a frequent experience of the elderly. Recent physiological and biochemical tests that have been studied showed no essential differences in relation to stress between normal healthy youngsters and healthy older persons. In a number of conditions, such as infections and antigenic stimuli, the older individuals seem to show a more superior and efficient response to the stimulus than do the very young, especially those under 2 years of age. Mortality rates from circulatory and surgical procedures are about the same for good-risk patients regardless of their age. Growing old, of itself, need not impair the responses to the strains of modern existence.

Each individual is endowed with an amazing margin of reserve at birth. Apparently this is specific for the individual. As yet, only the most crude methods are

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Members of the Committee on Aging are Drs. H. B. Mulholland, Chairman, Charlottesville, Va.; Edward L. Bortz, Philadelphia; Henry A. Holle, Austin, Texas; Wingate M. Johnson, Winston-Salem, N. C.; Theodore G. Klumpp, New York; Frederick C. Swartz, Lansing, Mich.; and Cecil Wittson, Omaha. Committee Staff: Mr. George W. Cooley, Secretary and Mr. Herbert B. Norton, Research Assistant.

available for studying the reserve of particular organs at the clinical level. However, conditions of physical sickness are now being observed, and methods are being tried in an endeavor to estimate the reserve of particular systems such as the pulmonary tract, the heart, the arterial system, and the nervous system. Exhaustion, experimentally, of certain organs such as the pancreas can produce temporary disease. When the body, with the passage of time, is unable to completely renew its energy and heal injured tissues, the scar of the disease remains. This stigma may be of little consequence if it occurs in a part of the body that is not vital to continued existence. On the other hand, even a small clot in a blood vessel in a vital area of the heart or the brain stem might produce fatal outcome to a body that is in otherwise excellent condition. As long as the individual maintains good homeostasis and thereby is capable of meeting the day-to-day stresses and strains satisfactorily, aging per se has little, if any, influence on impairing stress responses. The diseases and deteriorations of tissues in older individuals embarrass physiological responses and thereby set the stage for further structural damage. This is an important point, for it emphasizes the necessity for maintaining good physical fitness as a factor for long life.

In long-term illnesses, especially those in which considerable wear and tear of tissues occurs, with continued stimulus of the pituitary-adrenal axis, the 17-ketosteroid output is lowered. When the reserves of the body are extended in excess of energy replacement, the individual is living at a deficit. He is spending more of his basic vitality than he is renewing. At the particular moment in his life when the expenditure of tissue energy exceeds tissue repair, senescence has begun. The rate of senescence may be demonstrated very well experimentally. In animals, changes which resemble the degenerative alterations characteristic of old age may be produced in the organs by long-continued stresses. The body responds in a nonspecific as well as in a specific manner to the various obnoxious agents such as infection, neoplasm, metabolic deficiency, or organ decompensation. Impulses arrive at the anterior pituitary axis through the hypothalamic nuclei and through the mediation of epinephrine. Next, the pituitary secretes the trophic hormones. Through this mechanism there is a shift in the balance of hormone production with a relative diminution of thyrotropic and gonadotropic hormones with an increase in the production in corticotropin.

From the specific hormones of the adrenal glands, effects occur in practically every organ of the body. Tissue metabolism may be greatly altered. The blood sugar level may fall. An ulcer may develop somewhere in the gastrointestinal tract. Increased capillary permeability may occur. According to the adaptation reaction of Selye, these are classified as the first or alarm reaction phase. In the so-called counter shock phase, a reversal of some of these effects may take place. Authorities agree on the changes which take place in the structure and function of organs with advancing age. There is a loss of fluid and an increased frequency of achlorhydria. Frequently there is a mild loss of glucose tolerance. However, the healthy older body must be much more carefully studied before it is condemned to unhappy and deficit existence.

Since life entails a continual striving to attain aims, it is impossible to conceive of living without stress. The objectives of an ambitious individual are only obtained by strong drive with the expenditure of energy. Without some commitment of this kind there can be no stress. For many authorities the terms stress, strain, and striving are practically identical. Without motive there is no effort, without effort there is no strain, and without strain there is no stress. Stress implies combat—combat with oneself against some tendency or habit or against some circumstances in general. The time of stress may be short or long; the outcome may be unsuccessful. As a rule, the individual is aware of the stress. The stress itself is not so important as the depletion of energy leading to exhaustion. The problem then is simplified by consideration of maintenance of adequate organic reserve that may be physical or mental. Antistress factors then take on a new significance.

Fatigue, like stress, is a many-sided experience, one for which an adequate definition has not been stated. Fatigue refers to the condition of a body weakened by prolonged stress. This may set the stage for many clinical syndromes. The majority of these are referable to the circulation, the digestive tract, and the central nervous system. Definite changes in the physiochemical pattern of the blood may frequently be discovered. Fatigue is subjective; the patient has difficulty in performance. There is a drag and increasing unwillingness on the heart, the brain, and the nervous system to respond to demand. A tired person is unlikely to have any enthusiasm about anything. When he is enthusiastic the fatigue disappears. Weariness and boredom in oldsters are invited by lack of motivation. Personal attitudes take on significances as motivation reflecting a sense of values. This becomes more and more important with advancing years.

Conditions which produce stress and fatigue leading to exhaustion are now being studied. Their reflection in the various constituents of the blood and tissue fluids is becoming known. Protective nutrition, anxiety-resolving devices, and specific motivation are basic essentials. These are now generally accepted. Margins of reserve for each individual may be recreated that will grant him longer life and, perhaps, a more enjoyable one. Improved living conditions, which are the attributes of a society highly sensitive to social responsibility in the atomic era, are capable of bringing about a deeper measure of enjoyable existence.

In resisting the useless expenditure of energy, man's fight with time is his greatest battle. In that battle, his emotional life—the surplus of hope over despair, of love over indifference, of motive over resignation—is highly important. As Helton [2] points out, it is not a fight for the duration of the body so much as it is a fight for the duration of the capacity for happiness. One can be too busy and too active in the process of maturing to be annoyed by the deteriorations of aging. Purposeful activity up to the limits of physiological and mental optimum represents the most potent factor in the fight against premature human deterioration.

References

1. Selye, H.: What Is Stress? Metabolism **5**:525-530 (Sept.) 1956.

2. Helton, R. A.: Old People: A Rising National Problem, Harpers Magazine **179**:449-459 (Oct.) 1939.

MEDICAL NEWS

ALABAMA

State Medical Election.—The Medical Association of the State of Alabama has installed the following officers: Dr. John A. Martin, Montgomery, president; Dr. Edgar G. Givhan Jr., Birmingham, president-elect; Drs. Hugh E. Gray, Anniston; Samuel W. Windham, Dothan; William D. Anderson, Tuscaloosa; and Everett L. Strandell, Brewton, vice-presidents; Dr. Douglas L. Cannon, Montgomery, secretary-treasurer; and Mr. W. A. Dozier Jr., Montgomery, executive-secretary.

CONNECTICUT

Rabies in Animal.—Connecticut's first instance of rabies since 1949 was reported when a rabid skunk was found in New Canaan near the New York State border. It was reported that rabies in foxes has for several years been a problem in neighboring New York state, west of the Hudson River, which heretofore served as a natural barrier presumably in protecting Connecticut foxes.

FLORIDA

State Medical Election.—The Florida Medical Association has installed the following officers: Dr. William C. Roberts, Panama City, president; Dr. Jere W. Annis, Lakeland, president-elect; Dr. Ralph W. Jack, Miami, first vice-president; Dr. Walter E. Murphree, Gainesville, second vice-president; Dr. James T. Cook Jr., Marianna, third vice-president; Dr. Samuel M. Day, Jacksonville, secretary-treasurer; and Dr. Shaler A. Richardson, Jacksonville, editor.

ILLINOIS

Personal.—Dr. Andrew J. Toman, medical superintendent of the Bridewell for 20 years, has been named health officer of Berwyn succeeding Dr. Nicholas Frankovelgia, who resigned after serving as Berwyn health chief since 1954. Dr. Toman served at the Bridewell from 1932 to 1952 and from 1953 until his present appointment. He was medical director of the Chicago plant of Armour & Co.—Dr. Elvin L. Sederlin, formerly of Helena, Mont., has been appointed director of the Adams County Department of Health. He previously served as director of the local health services for the Montana State Board of Health. Before going to Montana, Dr. Sederlin served as director of the DuPage County Health Department.—Dr. Thornton A. Davis, Skokie, has been named president of the medical staff of the Ravenswood Hospital, Chicago.

Mobile Emergency Hospitals.—A mobile emergency hospital caravan, sponsored by the Illinois Department of Public Welfare in cooperation with the Illinois Civil Defense Agency, has had its premiere showing at the Illinois State Fair, Springfield. The mobile emergency hospital contains a representative portion of all equipment and facilities for a complete 200-bed civil defense emergency hospital. For display purposes, the hospital is transported in a caravan of two trucks and one passenger car for personnel.

The Federal Civil Defense Administration, through the Illinois Civil Defense Agency, has allocated 132 complete 200-bed hospitals to Illinois. These hospital units are stored in sealed boxes, 16 of them at public welfare institutions. The boxes are to be opened only in the event of an emergency. The mobile emergency hospital may be displayed in only 2,500 square feet of space, yet show all essential elements. The caravan display unit will be used for training purposes at meetings of local civil defense groups, medical and nursing societies.

The Illinois Department of Public Welfare is responsible for developing and training a staff of volunteers to operate a complete 200-bed hospital should a major disaster occur anywhere in Illinois. Dr. Frederick Plotke, chief, Illinois Public Health Service, will coordinate the emergency hospital project with federal and state civil defense agencies, the Illinois Public Aid Commission, Illinois State Medical Society, American Red Cross, Illinois National Guard, and the other medical and nursing groups.

Chicago

Society News.—The officers of the Chicago Society of Allergy for 1957-1958 are: Dr. Norman J. Ehrlich, president; Dr. Harold C. Wagner, president-elect; and Dr. Israel A. Fond, secretary-treasurer.

Dr. Dickinson Goes to Seattle.—Dr. Robert H. Dickinson has been appointed medical director of the Pinel Foundation Hospital, Seattle. He was formerly professor of psychiatry and coordinator of clinical services at the University of Chicago School of Medicine. Dr. Dickinson will assume his new duties in September succeeding Dr. Stanley Jackson who is entering private practice.

Personal.—Dr. Aldo A. Luisada, director, division of cardiology, Chicago Medical School, was invited by the heart associations of five South American countries to make a lecture tour commencing Aug. 15 and continuing through Sept. 25. The countries concerned are Peru, Chile, Argentina, Uruguay, and Brazil. Twenty-two lectures will be given in the following cities: Lima, Santiago, Buenos Aires, Rosario, Montevideo, San Paolo, and Rio de Janeiro.

KANSAS

University News.—Dr. Charles M. Poser has been given the rank of assistant professor of neurology and will form a new "Section of Experimental Neurology" within the department of medicine at Kansas University Medical School, Lawrence. Dr. Poser will continue

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

to be in charge of the electroencephalogram laboratory and will continue his work at the Veterans Administration Hospital, Winfield State Training School, and the Osawatomie State Hospital.

University Society of Internists.—The initial meeting of the Kansas University Society of Internists was held June 15. During the past year this organization was formed for the purpose of maintaining contacts between the past and present resident physicians in the department of medicine. Plans call for the society to meet annually for an informal breakfast reunion and the Ralph H. Major Lecture. Guest of honor at the first breakfast meeting was Dr. Paul Dudley White, Boston, who delivered the fourth Major lectureship.

Continue Polio Study.—Studies of the invading effect of different strains of polio virus will be continued at Kansas University Medical School under a grant of $104,170 from the National Foundation for Infantile Paralysis. The work will be directed by Dr. Herbert A. Wenner, research professor of pediatrics. Associates are Dr. Italo Archetti, associate professor of virus research, and Dr. George R. Dubes, assistant professor of pediatrics. Part of the work will be directed toward investigating sites of virus multiplication in the body and the moving of virus during an infection. Under a separate grant from the foundation, Dr. Wenner and associates are preparing antisera to Coxsackie and Echo viruses. The antisera are shipped to laboratories in the United States and foreign countries, where they are used by research teams studying these new viruses.

KENTUCKY

Society News.—Dr. Robert W. Robertson, Paducah, was recently elected president of the Kentucky Surgical Society. Dr. George H. Rodman, Greenville, was named vice-president and Dr. Charles M. Bernhard, Louisville, is secretary-treasurer.

LOUISIANA

Society News.—The Radiological Society of Louisiana has elected the following officers: president, Dr. Matthew R. Green, Ruston; vice-president, Dr. Joseph T. Brierre, New Orleans; and secretary-treasurer, Dr. Seymour Ochsner, New Orleans.

MAINE

Personal.—Dr. Adam P. Leighton, Portland, has been reappointed a member of the State of Maine Board of Registration of Medicine for another term of six years, and is continuing as secretary. This is his 43rd year as member and secretary of the board.

Society News.—At a recent meeting of the Maine Radiological Society the following officers were elected: president, Dr. John T. Konecki, Lewiston; vice-president, Dr. Irving L. Selvage Jr., Portland; secretary-treasurer, Dr. Francis J. O'Connor, Augusta.

MARYLAND

Dr. Dyke Goes to Maryland.—Dr. Lester M. Dyke has been appointed to direct the University of Maryland student health service. Dr. Dyke, currently director of the health services and professor of hygiene at the University of Illinois, Chicago, and medical director of the University Retirement System of Illinois, served with the United States Army Medical Corps for 26 years. He retired in 1946 with the rank of colonel. He will replace Dr. Harry A. Bishop, who will retire from the position he has held since September, 1948.

MISSOURI

Personal.—Dr. Willard M. Allen, head, department of obstetrics and gynecology, Washington University, St. Louis, received an honorary degree of doctor of science at the University of Rochester, N. Y., recently.

State Medical Election.—The Missouri State Medical Association has installed the following officers: Dr. Walter S. Sewell, Springfield, president; Dr. W. F. Francka, Hannibal, president-elect; Dr. M. Pinson Neal, Columbia, Dr. Paul R. Whitener, Florissant, and Dr. Joseph G. Webster, Kansas City, vice-presidents; Dr. Edward Bohrer, Jefferson City, secretary; and Dr. Jerome I. Simon, St. Louis, treasurer.

NEW JERSEY

New Building for Psychiatric Institute.—The new building at the New Jersey Neuro-Psychiatric Institute, Princeton, which was dedicated recently is named after Dr. Edward A. Strecker, emeritus professor of psychiatry, University of Pennsylvania who has served

The Edward A. Strecker building at the New Jersey Neuro-Psychiatric Institute, Princeton.

as consultant for the Pennsylvania hospitals and consultant for the Army Air Force, and who has been appointed as the first professor of psychiatry at the Seton Hall College of Medicine and Dentistry, Jersey City. The Edward A. Strecker Building will serve as an admissions office, an initial diagnostic unit for inpatient services, and as an adjunct to community services at the Neuro-Psychiatric Institute. Acoustical ceilings have been used throughout the building. The total cost was $216,600.

NEW YORK

Dr. Rioch to Give Salmon Lectures.—The Salmon Committee on Psychiatry and Mental Hygiene has announced that this year's Thomas William Salmon Lectures will be given by Dr. David McK. Rioch, director, division of neuropsychiatry, Walter Reed Army Institute of Research, Washington, D. C. Dr. Rioch will speak on "Research in Psychiatry: Certain Problems and Developments in Multi-Disciplinary Studies" at 4:30 and 8:30 p. m. Nov. 21, at Hosack Hall of the New York Academy of Medicine.

Albany Guild Formed.—Catholic physicians of the Diocese of Albany met at the College of Saint Rose at the invitation of William A. Scully, Bishop of Albany, to form a guild of Catholic physicians to be known as the Saint Luke's Guild of the Diocese of Albany. The assembled doctors approved a constitution which had been prepared by a committee headed by Drs. Clement J. Handron, of Troy, John Filippone, of Albany, and Hugh Leahy, of Albany. Officers of the newly formed Saint Luke's Guild, an affiliate of the National Federation of Catholic Physicians Guild, elected for the coming year are: Dr. Arthur J. Wallingford, of Albany, president; Dr. Clement J. Handron, of Troy, vice-president; Dr. George L. Marthy, of Albany, secretary; Dr. William N. Saint-John, of Glens Falls, treasurer. One of the purposes of the guild will be to offer programs in fields allied to religion and medicine.

New Hospital Signalling System.—An appropriation of $25,000 by the New York Community Trust will be used by the Memorial Center for Cancer and Allied Diseases to replace its present signalling system by a silent process that will send out selectively a radio impulse to any one of a maximum of 450 receivers carried by personnel of the institution. The signal will be heard only by the individual to whom it is directed. The area covered will include the group of buildings comprising the center.

Under the projected arrangement, a radio wave emanating from the hospital's telephone room will trigger a "beep beep" in the receiver carried by the person for whom the communication is intended. This will direct him to the nearest telephone to obtain his message from the operator.

Initial installation of 134 receivers will permit the discontinuance of an estimated 83% of the 1250 average daily pages made over the present audible system. The eliminated calls will include all regular audible paging during the night hours, from 10 p. m. to 7 a. m.

NORTH CAROLINA

Expansion of Pediatric Ward.—Memorial Hospital at the University of North Carolina, Chapel Hill, has become the recipient of a grant of $22,000 from the Tri-Sigma national social sorority for expansion of the space and facilities for crippled and sick children in the pediatrics ward. The expanded area will be named for the Robbie Page Memorial and will make possible an advanced therapy program. The grant will be met by matching funds from the North Carolina Medical Care Commission. A U-shaped outside terrace in the ward will be enclosed and the existing small play room walls removed in the process of reconstruction to produce a large play area, called a "common room."

Space for the therapy techniques, observation room, interview rooms, and other facilities will be available to aid in the children's treatment. The reconstruction will add a net space of 1800 square feet to the therapy area. The Memorial Fund was established in honor of Robbie who died of polio in 1951. Robbie was the son of Mr. and Mrs. Robertson Page of Douglaston, N. Y. Mrs. Page was national sorority president at the time.

OHIO

George Morris Curtis Lectureship.—A George Morris Curtis Lectureship has been established at the Ohio State University Health Center "in recognition of Dr. Curtis' leadership in the field of surgery." The lecture, to be given annually, is the culmination of the desire of many of Dr. Curtis' former students and associates to establish permanent tribute to him. Members of the division of thoracic surgery have made available a nucleus of $2,500 to establish the lectureship. Selection of speakers will be made by a committee consisting of the dean of the College of Medicine, the chairman of the department of surgery, the chief of the division of thoracic surgery, and the secretary of the lectureship fund. Tentative arrangements have been made to present the first lecture in October.

Convert Children's Home to Hospital.—Opportunity Home for Crippled Children, Toledo, is being converted into a hospital for the treatment of acute children's diseases. The transformation, costing about $100,000, to be completed in about six months, will provide 62 pediatric beds and 18 convalescent beds. The hospital will continue its rehabilitation and convalescent program for children with crippling diseases. Reason for the change to a complete hospital is the decline in the need for convalescent bed care for children. The east wing will be occupied by the new pediatric department and will be utilized for chronic convalescent care. The cerebral palsy clinic, with its occupational, speech and physical therapy departments, will be moved to the second floor along with the laboratory and medical records room. The x-ray department, now occupying the section to become surgery, will be transferred to the west wing, where additional facilities will provide for an emergency room, ambulance entrance, waiting room, doctors' room, and dietician's office.

SOUTH CAROLINA

Society News.—The South Carolina Society of Anesthesiologists has elected the following officers: president, Dr. John Doerr, Charleston; vice-president, Dr. James L. Duncan, Spartanburg; and secretary-treasurer, Dr. J. Ray Ivester, Charleston.

TEXAS

Society News.—Texas Industrial Medical Association has elected the following officers: Dr. Robert J. Potts, Dallas, president; Dr. Wendall H. Hamrick, Houston, president-elect; Dr. Max E. Johnson, Austin, vice-president; and Dr. Robert A. Wise, Houston, secretary-treasurer.——Dr. Margaret Watkins, Dallas, was recently elected president of the Texas Orthopedic Association. Other officers are Dr. Duncan McKeever, Houston, vice-president; Dr. B. C. Halley Jr., Fort Worth, secretary-treasurer; and Dr. Edmund Cowart, Houston, 1958 program chairman.

Research in Psoriasis.—The department of dermatology, Baylor University College of Medicine, Houston, has announced an annual award of $1,000 for research on psoriasis. Results of the research must have been

presented before a dermatological medical society or published in a recognized medical journal during the calendar year. The name of any applicant for the award, together with supporting data, should be submitted for consideration by Dec. 31 of the same year. The recipient will be determined by a committee composed of Drs. Marcus B. Caro, Edward P. Cawley, Arthur C. Curtis, Eugene M. Farber, John M. Knox, Aaron B. Lerner, and Carl T. Nelson. For information write Dr. John M. Knox, Department of Dermatology, Baylor University, College of Medicine, Houston 25, Texas.

VERMONT

University News.—Approval of the establishment of separate departments of pediatrics and radiology, formerly having been divisions of the departments of medicine and surgery, respectively, at the University of Vermont College of Medicine, Burlington, beginning July 1, has been announced.

WEST VIRGINIA

Postgraduate Institute.—The second Postgraduate Institute, sponsored jointly by the Eastern Panhandle Medical Society and the West Virginia Chapter of the American Academy of General Practice, will be held at the Shenandoah Hotel, in Martinsburg, Sept. 21-22. The general session includes the following topics and speakers:

Rationality and Irrationality in Antibiotic Mixtures, Dr. Count D. Gibson, associate professor of medicine, Medical College of Virginia, Richmond.

Management of Pulmonary Emphysema: Physiologic Basis and Practical Considerations, Dr. John B. Hickam, associate professor of medicine, Duke University, Durham, N. C.

Cholesterol—And Vascular Disease, Dr. John H. Hodges, assistant professor of medicine, Jefferson Medical College, Philadelphia.

Pharmacologic Horizons—An Avalanche of New Drugs, John C. Krantz Jr., Ph.D., head, department of pharmacology, University of Maryland, Baltimore.

Peripheral Vascular Disease—Diagnosis and Treatment, Dr. Louis M. Krause, professor of clinical medicine, University of Maryland, Baltimore.

Three separate sessions have been arranged for Sept. 22: pediatrics, obstetrics, gynecology. Application has been made for a credit of nine hours in category I for academy members. Information may be obtained from Dr. Halvard Wangee, General Chairman, Box 175, Shepherdstown, W. Va.

GENERAL

Muscular Dystrophy Grants.—Recent allocations totaling $134,280.96 to support research in muscular dystrophy have been made by Muscular Dystrophy Associations of America, Inc., for scientific studies. Of this sum, $26,460 was appropriated for a new research project and $107,820.96 for renewed or additional aid for 12 studies already under way. The new grant-in-aid for research at the University of Pittsburgh is to Dr. Thaddeus S. Danowski, professor of research medicine, for "muscular dystrophy studies." An additional $2,000 grant supplements the present research being conducted by Dr. Gilbert H. Glaser at Yale University School of Medicine, New Haven, Conn., where a renewal grant of $7,610.36 has been made to Melvin V. Simpson, Ph.D. Additional grants-in-aid for continued scientific studies have been renewed at the University of Wisconsin Medical School, Madison, $11,988; Harvard University Medical School, Cambridge, Mass., $4,860; University of Illinois College of Medicine, Chicago, $6,987.60; University of Rochester School of Medicine and Dentistry, N. Y., $16,135; University of California Medical Center, Los Angeles, $13,400; Western Reserve University, Cleveland, $7,452; University of Oklahoma School of Medicine and University Hospitals, Oklahoma City, $7,074; Columbia University College of Physicians and Surgeons, New York City, $12,474 and $3,240 (two grants); New York University Washington Square College of Arts and Science, New York City, $14,600.

Prevalence of Poliomyelitis.—According to the National Office of Vital Statistics, the following number of reported cases of poliomyelitis occurred in the United States, its territories and possessions in the weeks ended as indicated:

Area	Aug. 3, 1957 Paralytic Type	Aug. 3, 1957 Total Cases	Aug. 4, 1956 Total Cases
New England States			
Maine	1	1	...
New Hampshire	1	1	...
Vermont	...	...	1
Massachusetts	1	2	8
Rhode Island	...	...	4
Connecticut	...	3	1
Middle Atlantic States			
New York	4	15	25
New Jersey	1	5	6
Pennsylvania	...	7	10
East North Central States			
Ohio	3	23	30
Indiana	3	8	16
Illinois	5	30	183
Michigan	6	27	26
Wisconsin	1	12	17
West North Central States			
Minnesota	1	8	6
Iowa	1	2	26
Missouri	1	7	17
North Dakota	...	2	...
South Dakota	...	...	4
Nebraska	...	1	11
Kansas	2	5	9
South Atlantic States			
Delaware	...	...	...
Maryland	1	1	5
District of Columbia	5	6	1
Virginia	1	7	12
West Virginia	1	3	4
North Carolina	2	23	12
South Carolina	2	3	2
Georgia	2	3	14
Florida	2	3	9
East South Central States			
Kentucky	4	7	4
Tennessee	1	3	9
Alabama	...	2	2
Mississippi	...	7	4
West South Central States			
Arkansas	...	1	17
Louisiana	1	4	41
Oklahoma	1	9	12
Texas	8	23	47
Mountain States			
Montana	...	...	1
Idaho	...	1	6
Wyoming	...	1	2
Colorado	...	2	9
New Mexico	2	4	4
Arizona	...	1	4
Utah	...	...	17
Nevada	...	...	4
Pacific States			
Washington	...	...	6
Oregon	1	3	10
California	5	33	104
Territories and Possessions			
Alaska	...	...	...
Hawaii	...	...	1
Puerto Rico	6	6	...
Total	77	340	758

Personal.—In recognition "of accomplishments in Pan American fellowship and public health, and in appreciation of their long service to the organization" honorary membership certificates were presented by the United States–Mexico Border Public Health Association to the following: Dr. Donald Davey, assistant director, division of local health services, California Department of Public Health; Dr. Fred L. Soper, director, Pan American Sanitary Bureau, Washington, D. C.; Dr. Ignacio Morones Prietom secretario, Secretaria de Salubridad y Asistencia Mexico, D. F. Mexico; Dr. Manuel E. Pesqueira, sub-secretario, Secretaria de Salubridad y Asistencia, Mexico, D. F.

Allergy Foundation Awards.—The American Foundation for Allergic Diseases has announced awards of $500 quarterly or summer scholarships to 20 medical students from approved medical schools throughout the United States and Canada to encourage young students to broaden their knowledge in the field of the allergic diseases by research and clinical training. These awards were made possible by a grant to the foundation by the Gustavus and Louise Pfeiffer Research Foundation.

The students selected were nominated by the deans of their respective medical schools in collaboration with the heads of basic science departments at these institutions. The awards were made by the board of trustees of the foundation on recommendation of its Scientific and Educational Council. The purpose of the awards is to expose the student to experience in the basic sciences related to allergy and to broaden the application of this knowledge through clinical experience. The American Foundation for Allergic Diseases, with headquarters at 801 Second Ave., New York City, was established late in 1953, not only to promote medical education and research in the field of allergic diseases, but also to expand public education in this area.

Surgeons Meeting in Chicago.—The 22nd annual congress of the United States and Canadian Sections of the International College of Surgeons will be held Sept. 8-12 in the Palmer House, Chicago. The program includes the following symposiums: Injuries of the Lumbar Spine, Eye Muscles, and Lacrimal Apparatus. Foreign speakers include Dr. A. K. Saha, Calcutta, India; Dr. John Charnley, Manchester, England; Dr. Jesus V. Tamesis, Manila, Phillippines; and Dr. Ronald Jarman, London. Panel discussions include the following topics and moderators:

Myringoplasty and Tympanoplasty for the Improvement of Hearing in Non-Otosclerotic Conductive Losses, Dr. George Shambaugh Jr., Chicago.

Poliomyelitis and the Role of the Otolaryngologist in Its Management, Dr. George A. Saxton Jr., Chicago.

Tumors of the External Ear, Glomus Tumors, Acoustic Neuromas, Dr. John Lindsay, Chicago.

A special symposium to be conducted Sept. 12, will consider the medical problems of the Navy, particularly those arising out of the atomic age. Besides a general assembly there will be section programs in the following: Coloproctologic surgery, neurosurgery, obstetrics-gynecology, occupational surgery, ophthalmology-otolaryngology, orthopedic surgery, plastic and reconstructive surgery, and urologic surgery. For information write Dr. Ross T. McIntire, Executive Director, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10.

Obstetricians and Gynecologists Meet.—The 68th annual meeting of the American Association of Obstetricians and Gynecologists will be held Sept. 5-7 at the Homestead, Hot Springs, Va. The presidential address will be given by Dr. F. Bayard Carter, Durham, N. C. and the Joseph Price Oration Sept. 5 by Dr. Magnus Haines, chief of pathology, Chelsea Hospital for Women, University of London School of Medicine. The prize thesis of the American Association of Obstetricians and Gynecologists Foundation, Inc., will be given by Dr. Harry S. McGaughey Jr. on "The Placental Transfer in Normal and Toxic Gestation." The program includes the following topics to be given by invited speakers:

Closure of the Incompetent Cervix During Pregnancy, Dr. Robert H. Barter, George Washington University School of Medicine, Washington, D. C.

Microscopic Anatomy of the Fetal Membranes, Dr. David N. Danforth, Evanston, Ill.

Cervical Stump Carcinoma, Dr. Robert N. Creadick, Duke University School of Medicine, Durham, N. C.

Conservation of Ovarian Tissue at Radical Surgery for Carcinoma of the Cervix, Dr. Milton L. McCall, Louisiana State University School of Medicine, New Orleans, La.

The Team Approach in Endometrial and Cervical Neoplasia, Dr. John A. Wall, Texas Medical Center, Houston, Texas.

A motion picture session is scheduled for the afternoon of Sept. 5 at which Mr. John Howkins, Mr. Keith Vartan and Mr. Alistair Gunn, Gynaecological Travellers of Great Britain and Ireland, will make presentations. The banquet will be held the evening of Sept. 6. For information write Dr. E. Stewart Taylor, 4200 E. Ninth Ave., Denver 20, Colo.

EXAMINATIONS AND LICENSURE

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Examination.* Montgomery, June 17-19. Sec., Dr. D. G. Gill, State Office Building, Montgomery 4.

ARIZONA:* *Examination and Reciprocity.* Phoenix, Oct. 16-18. Exec. Sec., Mr. Robert Carpenter, 826 Security Bldg., Phoenix.

ARKANSAS:* *Examination and Reciprocity.* Little Rock, Nov. 7. Sec., Dr. Joe Verser, Harrisburg.

CALIFORNIA: *Written Examination.* Sacramento, Oct. 21-24. *Oral Examination.* San Francisco, Nov. 16. *Oral and Clinical for Foreign Graduates.* San Francisco, Nov. 17. Sec., Dr. Louis E. Jones, 1020 N St., Sacramento 14.

COLORADO:* *Reciprocity.* Denver, Oct. 8. *Examination.* Denver, Dec. 3-4. Exec. Sec., Mrs. Beulah H. Hudgens, 715 Republic Bldg., Denver 2.

CONNECTICUT:* *Examination.* Hartford, Nov. 12-14. Sec., Dr. Creighton Barker, 160 St. Ronan St., New Haven. *Homeopathic. Examination.* Derby, Sept. 10. Sec., Dr. Donald A. Davis, Derby.

DELAWARE: *Examination.* Dover, Jan. 14-16. *Reciprocity.* Dover, Jan. 23. Dr. Joseph S. McDaniel, Professional Bldg., Dover.

DISTRICT OF COLUMBIA:* *Reciprocity.* Washington, Sept. 9. *Examination.* Washington, Nov. 12-13. Deputy Director, Mr. Paul Foley, 1740 Massachusetts Ave., N.W., Washington, D. C.

FLORIDA:* *Examination.* Miami, Nov. 24-26. Sec., Dr. Homer L. Pearson, 901 N.W. 17th St., Miami 36.

GEORGIA: *Examination.* Atlanta, Oct. 8-9. *Reciprocity.* Atlanta, Oct. 10. Sec., Mr. Cecil L. Clifton, 111 State Capitol, Atlanta 3.

IDAHO: *Examination and Reciprocity.* Boise, Jan. 13-15. Ex. Sec., Mr. Armand L. Bird, 364 Sonna Bldg., Boise.

KENTUCKY: *Examination.* Louisville, Dec. 9-11. Sec., Dr. Russell E. Teague, 620 South Third St., Louisville 2.

MAINE: *Examination.* Portland, Nov. 12-14. *Reciprocity.* Portland, Nov. 12. Sec., Dr. Adam P. Leighton, 192 State St., Portland.

MARYLAND: *Reciprocity.* Baltimore, September. *Examination.* Baltimore, Dec. 10-13. Sec., Dr. Frank K. Morris, 1211 Cathedral St., Baltimore.

MASSACHUSETTS: *Examination.* Boston, Jan. 14-17. Sec., Dr. Robert C. Cochrane, 37 State House, Boston.

MICHIGAN:* *Examination.* Lansing, Oct. 9-11. Exec. Sec., Dr. E. C. Swanson, 118 Stevens T. Mason Bldg., Lansing 8.

MINNESOTA:* *Examination and Reciprocity.* Minneapolis, Oct. 15-17. Sec., Dr. F. H. Magney, 230 Lowry Medical Arts Bldg., St. Paul 2.

MISSISSIPPI: *Reciprocity.* Jackson, December. *Examination.* Jackson, June. Asst. Sec., Dr. R. N. Whitfield, Old Capitol, Jackson 113.

MONTANA: *Examination and Reciprocity.* Helena, Oct. 1-2. Sec., Dr. Thomas L. Hawkins, 535 Fuller Ave., Helena.

NEBRASKA:* *Examination.* Omaha, June. Sec., Mr. Husted K. Watson, Room 1009, State Capitol Bldg., Lincoln 9.

NEVADA:* *Examination and Reciprocity.* Reno, Sept. 3. Sec., Dr. George H. Ross, 112 North Curry St., Carson City.

NEW HAMPSHIRE: *Examination and Reciprocity.* Concord, Sept. 11-13. Sec., Dr. John S. Wheeler, 107 State House, Concord.

NEW JERSEY: *Examination.* Trenton, Oct. 15-18. Sec., Dr. Patrick H. Corrigan, 28 W. State St., Trenton.

NEW MEXICO:* *Examination and Reciprocity.* Santa Fe, Nov. 18-19. Sec., Dr. R. C. Derbyshire, 227 East Palace Ave., Santa Fe.

NEW YORK: *Examination.* Albany, Buffalo, New York and Syracuse, Dec. 10-13. Sec., Dr. Stiles D. Ezell, 23 South Pearl St., Albany 7.

NORTH CAROLINA: *Endorsement.* Morehead City, Oct. 12. Asst. Sec., Mrs. Louise J. McNeill, 716 Professional Bldg., Raleigh.

NORTH DAKOTA: *Examination.* Grand Forks, Jan. 9-12. *Reciprocity.* Grand Forks, Jan. 12. Sec., Dr. C. J. Glaspel, Grafton.

OHIO: *Endorsement.* Columbus, Oct. 1. *Examination.* Columbus, Dec. 17-19. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus 15.

OKLAHOMA: *Examination.* Oklahoma City, Dec. 14-15. Sec., Dr. E. L. Lester, 813 Braniff Bldg., Oklahoma City.

OREGON:* *Reciprocity and Endorsement.* Portland, Oct. 3-5. *Examination.* Portland, January. Exec. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland.

RHODE ISLAND:* *Examination.* Providence, Oct. 3-4. Administrator of Professional Regulation, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH CAROLINA: *Examination.* Columbia, Dec. 10. Sec., Dr. H. E. Jarvey, Jr., 1329 Blanding St., Columbia.

SOUTH DAKOTA:* *Examination.* Sioux Falls, Jan. 21-22. Exec. Sec., Mr. John C. Foster, 300 First National Bank Bldg., Sioux Falls.

TENNESSEE:* *Examination.* Memphis, Sept. 25-26. Sec., Dr. H. W. Qualls, 1635 Exchange Bldg., Memphis 3.

TEXAS:* *Examination and Reciprocity.* Fort Worth, Dec. 5-7. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination.* Salt Lake City, July 9-11. Director, Mr. Frank E. Lees, 324 State Capitol Bldg., Salt Lake City 1.

VIRGINIA: *Reciprocity.* Richmond, Dec. 4. *Examination.* Richmond, Dec. 5-7. Address: Office of the Secretary, 631 First St., S.W., Roanoke.

WASHINGTON:* *Examination.* Seattle, Jan. 13-15. Sec., Mr. Thomas A. Carter, Capitol Bldg., Olympia.

WEST VIRGINIA: *Reciprocity.* Charleston, Oct. 7. *Examination.* Charleston, January. Sec., Dr. Newman H. Dyer, State Office Bldg., No. 3, Charleston 5.

WISCONSIN:* *Reciprocity.* Madison, Oct. 18. *Examination.* Madison, January. Sec., Dr. Thomas W. Tormey, Jr., 1140 State Office Bldg., Madison.

WYOMING: *Examination and Reciprocity.* Cheyenne, Sept. 30. Sec., Dr. Franklin D. Yoder, State Office Bldg., Cheyenne.

ALASKA:* On application in Anchorage and Juneau. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

GUAM: *Subject to Call.* Act. Sec., Dr. S. F. Provencher, Agana.

HAWAII: *Examination.* Honolulu, Jan. 13-14. Sec., Dr. I. L. Tilden, 1020 Kapiolani St., Honolulu.

PUERTO RICO: *Examination.* San Juan, September 4. Sec., Mr. Joaquin Mercado Cruz, Box 9156, Santurce.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARIZONA: *Examination.* Tucson, Sept. 17. *Reciprocity.* Tucson, Sept. 19. Sec., Mr. Herman E. Bateman, University of Arizona, Tucson.

ARKANSAS: *Examination.* Little Rock, Oct. 7-8. Sec., Mr. S. C. Dellinger, Zoology Department, University of Arkansas, Fayetteville.

COLORADO: *Examination and Reciprocity.* Denver, Sept. 4-5. Sec., Dr. Esther B. Starks, 1459 Ogden St., Denver 18.

CONNECTICUT: *Examination.* New Haven, Oct. 12. Exec. Asst., Mrs. Regina G. Brown, 258 Bradley St., New Haven 10.

DISTRICT OF COLUMBIA: *Examination.* Washington, Oct. 21-22. Deputy Director, Mr. Paul Foley, 1740 Massachusetts Ave., N. W., Washington, D. C.

FLORIDA: *Examination.* Gainesville, Nov. 9. Sec., Mr. M. W. Emmel, Box 340, University of Florida, Gainesville.

IOWA: *Examination and Reciprocity.* Des Moines, Oct. 8. Sec., Dr. Elmer W. Hertel, Waverly.

MICHIGAN: *Reciprocity.* Ann Arbor, Sept. 7. *Examination.* Ann Arbor and Detroit, Oct. 11-12. Sec., Mrs. Anne Baker, 116 Stevens T. Mason Bldg., West Michigan Ave., Lansing.

MINNESOTA: *Examination.* Minneapolis, Oct. 1-2. Sec., Dr. Raymond N. Bieter, 105 Millard Hall, University of Minnesota, Minneapolis 14.

NEVADA: *Examination.* Reno, Sept. 3. Sec., Dr. Donald G. Cooney, Box 9005, University Station, Reno.

NEW MEXICO: *Reciprocity.* Santa Fe, Sept. 29. *Examination.* Santa Fe, Oct. 20. Sec., Mrs. Marguerite Cantrell, Box 1522, Santa Fe.

OKLAHOMA: *Examination.* Oklahoma City, Sept. 27-28. Sec., Dr. E. F. Lester, 813 Braniff Bldg., Oklahoma City.

OREGON: *Examination.* Portland, Sept. 7. Sec., Dr. Earl M. Pallett, University of Oregon, Eugene.

SOUTH DAKOTA: *Examination.* Vermillion, Dec. 6-7. Sec., Dr. Gregg M. Evans, 310 E. 15th St., Yankton.

TENNESSEE: *Examination.* Memphis, Sept. 25-26. Sec., Dr. O. W. Hyman, 62 South Dunlap St., Memphis 3.

TEXAS: *Examination.* Austin, October. Chief Clerk, Miss Pearl A. Barrera, 407 Perry-Brooks Bldg., Austin.

WISCONSIN: *Examination.* Madison, Sept. 20 and Milwaukee, Dec. 7. Sec., Mr. William H. Barber, 621 Ransom St., Ripon.

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*Basic Science Certificate required.

DEATHS

Donaldson, Walter Foster ✱ Bakerstown, Pa.; born in Bridgeville Sept. 13, 1873; Northwestern University Medical School, Chicago, 1898; president of the Medical Society of the State of Pennsylvania in 1917 and later became secretary, serving until 1944, when he was elected secretary-treasurer, an office to which he was subsequently reelected until 1952, when he retired; past-president and director of the Allegheny County Medical Society; member of the Council on Medical Education and Hospitals of the American Medical Association from 1924 to 1931, a member of its Judicial Council from 1931 to 1956, and its House of Delegates from 1923 to 1948; on the faculty of the University of Pittsburgh School of Medicine from 1921 to 1934; served as medical director and president of the Standard Life Insurance Company of America; fellow of the American College of Physicians; member of the Pittsburgh Academy of Medicine and Nu Sigma Nu; secretary of the Pennsylvania Committee on Medical Preparedness for National Defense during World War II; member of the National Health Program, Federal Conference Committee from 1938 to 1940; chairman, committee on war participation from 1942 to 1945; formerly on the staffs of the South Side Hospital, Presbyterian Hospital, and the Woman's Hospital in Pittsburgh; served as chairman of the health committee of the Pittsburgh Chamber of Commerce; editor of the *Pittsburgh Medical Bulletin* from 1928 to 1947; served as editor of the *Pennsylvania Medical Journal;* died June 26, aged 83.

Hammond, Roland ✱ Providence, R. I.; born in Bellingham, Mass., July 29, 1875; Harvard Medical School, Boston, 1902; specialist certified by the American Board of Orthopaedic Surgery; past-president of the Rhode Island Medical Society; member of the American Orthopaedic Association, of which he was formerly vice-president, and the American Academy of Orthopaedic Surgeons; fellow of the American College of Surgeons; member of the House of Delegates of the American Medical Association from 1924 to 1928, from 1930 to 1933, and 1937-1938; veteran of World War I; consultant at the Newport (R. I.) Hospital, Memorial Hospital, Pawtucket, Westerly (R. I.) Hospital, South County Hospital in Wakefield, and Roger Williams General, St. Joseph's, Miriam, Rhode Island, Providence Lying-In, and Charles V. Chapin hospitals; died in the Jane Brown Hospital June 11, aged 81, of cerebral thrombosis.

Place, Edwin Hemphill ✱ Francestown, N. H.; born in Milton, Wis., Sept. 29, 1880; Harvard Medical School, Boston, 1904; member of the Massachusetts Medical Society; for many years practiced in Boston, where he was on the faculty of his alma mater, Tufts College Medical School, and the Massachusetts Institute of Technology; at one time member of the board of health of Boston; for many years associated with the Boston City Hospital; served as consultant in contagious diseases at the Emerson Hospital in Concord, Newton (Mass.) Hospital and Massachusetts Eye and Ear Infirmary, Massachusetts General, Faulkner, Boston Floating, Massachusetts Memorial, and the Boston State hospitals in Boston; died June 17, aged 76, of bronchopneumonia and arteriosclerosis.

Seay, Thomas Waller ✱ Spencer, N. C.; born in Spotsylvania, Va., Sept. 5, 1894; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1921; charter member of the American Academy of General Practice; veteran of World War I; served on the Spencer draft board during World War II; chairman of the East Spencer school board for six years, and for four years county coroner; past-president of the Rowan–Davie Counties Medical Society; in 1949 named "practitioner of the year" for North Carolina; associated with the Rowan Memorial Hospital in Salisbury, where he was chief of staff; member and past-president of the Kiwanis Club; on the staff of the Rowan Memorial Hospital in Salisbury; died May 20, aged 62, of heart disease.

Smith, Edward Milton Jr., Commander, U. S. Navy, Norfolk, Va.; born in Baltimore May 10, 1922; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1946; appointed a lieutenant (jg) in the Medical Corps of the Naval Reserve on March 6, 1946; reported for active duty on July 10, 1947; accepted an appointment in the regular Navy on Dec. 30, 1947; assigned duty under instruction in public health at the Johns Hopkins University School of Hygiene and Public Health, Baltimore on Aug. 21, 1954; on completion of this course was ordered to the Navy's Preventive Medicine Unit #2 at Norfolk, Va., as officer in charge, serving in that capacity at the time of his death May 13, aged 35, of injuries received in an automobile accident.

Westerhoff, Peter De Tilius, Midland Park, N. J.; Long Island College Hospital, Brooklyn, 1924; formerly on the faculty of Columbia University College of Physicians and Surgeons, New York City; member of the American Academy of Ophthalmology and Otolaryngology; specialist certified by the American Board of Otolaryngology; served as mayor; veteran of World Wars I and II; member of the staff, St. Joseph's Hospital, Paterson; died June 21, aged 60, of myocardial infarction.

Berzins, Hugo Arnolds ✱ Columbus, Ohio; Latvijas Universitate Medicinas Fakultate, Riga, Latvia, 1930; member of the Mercy Hospital, where he died June 5, aged 60, of myocardial infarction.

Crane, Percy Radcliffe, Levittown, N. Y.; Long Island College Hospital, Brooklyn, 1906; for many years connected with the New York City Department of Health; died in Meadowbrook Hospital, Hempstead, June 22, aged 72.

Cunningham, Modie Ezra, Lafayette Hill, Pa.; Birmingham Medical College, Birmingham, Ala., 1900; veteran of the Spanish–American War and World

✱ Indicates Member of the American Medical Association.

War I; died in the Montgomery Hospital, Norristown, June 24, aged 79, of cerebral vascular accident and cerebral thrombosis.

Eurit, Deering Heaston, Argyle, Wis.; Indiana University School of Medicine, Indianapolis, 1921; died June 26, aged 68.

Feeley, Matilda Anne, San Francisco; Cooper Medical College, San Francisco, 1907; an associate member of the American Medical Association; died in the Notre Dame Hospital April 23, aged 79, of arteriosclerotic cardiovascular disease.

Fellman, George Harry ✦ Milwaukee; Rush Medical College, Chicago, 1897; past-president of the Medical Society of Milwaukee County and the Milwaukee Pediatric Society; a founder member of the American Academy of Pediatrics; at one time professor of pediatrics at the Milwaukee Medical College; served on the staffs of the Milwaukee, Milwaukee Children's, and the Evangelical Deaconess hospitals; died May 28, aged 85, of coronary occlusion.

Fikany, Ethel Maria, Albuquerque, N. M.; Rush Medical College, Chicago, 1926; died in Good Samaritan Hospital, Phoenix, Ariz., June 14, aged 65, of heart failure.

Foley, Charles Joseph ✦ Havre de Grace, Md.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1921; fellow of the American College of Surgeons; formerly vice-president of the Medical and Chirurgical Faculty of Maryland; on the staff of the Harford Memorial Hospital; a director of the Citizens National Bank and the Cash Loan Company; died in the Mercy Hospital, Baltimore, June 26, aged 61.

Forbes, Neil Morton Jr. ✦ Laurel, Miss.; University of Tennessee College of Medicine, Memphis, 1941; veteran of World War II and was awarded the Silver Star for gallantry in action Feb. 16, 1945, without regard for his own personal safety, constantly exposed himself to heavy enemy fire to care for the wounded; died in Birmingham, Ala., May 26, aged 40.

Garber, Erwin Cleveland ✦ Dunkirk, Ind.; Ohio Medical University, Columbus, 1905; served as city health officer and county coroner; surgeon for the Pennsylvania Railroad; a director of the First State Bank; on the staffs of the Ball Memorial Hospital in Muncie and the Jay County Memorial Hospital in Portland, where he died May 28, aged 75, of uremia and auricular fibrillation.

Gordon, Louis E., Van Nuys, Calif.; Rush Medical College, Chicago, 1897; died in the Cedars of Lebanon Hospital, Los Angeles, June 19, aged 81, of brain tumor.

Griffith, Wilbert E. ✦ Yatesboro, Pa.; College of Physicians and Surgeons, Baltimore, 1908; died in Richmond, Va., May 27, aged 71, of coronary arteriosclerosis.

Hardy, Thomas Griffin, Farmville, Va.; Medical College of Virginia, Richmond, 1914; member of the Medical Society of Virginia; fellow of the American College of Surgeons; past-president of the Fourth District Medical Society; formerly member of the state board of medical examiners; served with the British and American armies during World War I; for many years associated with the Southside Community Hospital; died June 24, aged 66.

Hartstein, Edward, Forest Hills, N. Y.; Universität Leipzig Medizinische Fakultät, Saxony, Germany, 1936; member of the Medical Society of State of New York; veteran of World War II; died March 17, aged 46, of coronary occlusion.

Harvey, Frederick Charles, Spokane, Wash.; McGill University Faculty of Medicine, Montreal, Que., Canada, 1897; specialist certified by the American Board of Ophthalmology; member of the emeritus staff, Sacred Heart Hospital; died in St. Luke's Hospital May 23, aged 85, of cardiovascular accident.

Hays, Henry Cornwell, Bonner Springs, Kan.; Medical College of Ohio, Cincinnati, 1892; veteran of the Spanish–American War; for many years member of the school board; first president of the Rotary Club, of which he was a charter member; died in Kansas City, Mo., June 19, aged 89, of cancer of the prostate.

Hecker, Charles Henry, Palo Alto, Calif.; Washington University School of Medicine, St. Louis, 1911; veteran of World War I; served on the staff of the Veterans Administration Hospital; died June 10, aged 82.

Herrmann, Francis Joseph, Logansport, Ind.; Bellevue Hospital Medical College, New York City, 1897; died in St. Joseph Hospital June 4, aged 81.

Hochfeld, Leo, New York City; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1937; member of the Medical Society of the State of New York, the American College of Allergists, and the American Society of Clinical Pathologists; on the staffs of Morrisania, Beth David, and Lebanon hospitals; died June 30, aged 50, of Hodgkin's disease.

Hoffmann, Bernhard Theodore ✦ Glendora, Calif.; Chicago College of Medicine and Surgery, 1912; formerly practiced in Chicago, where he was on the staff of the Grant Hospital; died July 6, aged 83.

Jones, John E., Evans Mills, N. Y.; University of Buffalo School of Medicine, 1896; served as health officer, a member of the board of education, and a member of the village board; died in Utica June 22, aged 85, of coronary insufficiency and cerebral hemorrhage.

Kelly, John Vincent ✦ St. Paul; Milwaukee Medical College, 1911; member of the staffs of St. Joseph's and St. Luke's hospitals; died June 20, aged 74, of hypertension and valvular heart disease.

Kinney, Leslie Theron ✦ Norwich, N. Y.; Syracuse University College of Medicine, 1927; county coroner; served as city health officer, school physician, and physician for the county welfare department; a member of the staff of the Chenango Memorial Hospital; died in the Binghamton (N. Y.) City Hospital June 25, aged 54.

McCarty, Eugene Miller ✦ Rumford, Maine; Medical School of Maine, Portland, 1900; fellow of the American College of Surgeons; died May 3, aged 82, of arteriosclerotic heart disease.

McGugan, Arthur, Denver; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1892; an associate member of the American Medical Association; veteran of World War I; died May 28, aged 86, of cerebral thrombosis and arteriosclerosis.

McIntire, Fred Joseph Jr. ✦ Marblehead, Mass.; New York University College of Medicine, 1943; specialist certified by the American Board of Otolaryngology; veteran of World War II; on the staffs of the Massachusetts Eye and Ear Infirmary in Boston, Union Hospital in Lynn, and the Lynn (Mass.) Hospital, where he died June 18, aged 42, of cancer.

McLaughlin, Charles William ✦ Washington, Iowa; State University of Iowa College of Medicine, Iowa City, 1896; member of the honorary staff, Washington County Hospital, where he died May 26, aged 87, of uremia.

McLean, William Joseph, Santa Monica, Calif.; Tulane University School of Medicine, New Orleans, 1916; died June 4, aged 63, of a heart attack.

McMahon, Curtman, Springfield, Ill.; St. Louis College of Physicians and Surgeons, 1907; died May 30, aged 71.

Martin, Harry Bond ✦ Harrold, S. D.; Northwestern University Medical School, Chicago, 1908; died May 25, aged 72.

Millhoff, William Clarence Dimmick, Clayton, N. M.; Harvard Medical School, Boston, 1918; died May 28, aged 64, of coronary occlusion.

Ming, Charles Morris ✦ Okmulgee, Okla.; Washington University School of Medicine, St. Louis, 1910; specialist certified by the American Board of Radiology; member of the Radiological Society of North America and the American College of Radiology; died in Tulsa May 27, aged 68.

Minteer, James Frank, Butler, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1901; died in Worthington April 20, aged 83, of pulmonary embolism.

Mintzer, George Seltzer, Philadelphia; Medico-Chirurgical College of Philadelphia, 1899; an associate member of the American Medical Association; veteran of the Spanish–American War and World War I; served on the staff of the Methodist Hospital; died June 11, aged 79, of carcinoma.

Morgan, John William Henry ✦ Rose Hill, Va.; University of Virginia Department of Medicine, Charlottesville, 1943; interned at the Ohio Valley General Hospital; died May 30, aged 40.

Morgan, William Earle, Aberdeen, Wash.; University of Oregon Medical School, Portland, 1943; member of the Washington State Medical Association; fellow of the American College of Surgeons; veteran of World War II; died May 31, aged 39, of coronary occlusion.

Muehleck, George Ernest ✦ New York City; Columbia University College of Physicians and Surgeons, New York City, 1918; assistant clinical professor of surgery at New York University College of Medicine; for many years associated with the Lenox Hill Hospital; died June 6, aged 63.

Palmer, Clarence Bruckner ✦ Covington, Ga.; Emory University School of Medicine, Atlanta, 1929; vice-councilor of the Medical Association of Georgia; veteran of World War II; member of the staff of the Piedmont Hospital in Atlanta and Newton County Hospital; died June 3, aged 51, of myocardial infarction, and nephrolithiasis.

Parkinson, Vernon Matthew, Dolgeville, N. Y.; University and Bellevue Hospital Medical College, New York City, 1912; an associate member of the American Medical Association; past-president of the Herkimer County Medical Society; served as medical superintendent of the Montgomery Sanitarium in Amsterdam and the Pine Crest Sanatorium in Salisbury Center; director of the First National Bank of Dolgeville; died May 30, aged 68, of carcinoma of the sigmoid.

Parson, Willard Sigsbee ✦ Baltimore; Medical College of Virginia, Richmond, 1924; member of the American Academy of General Practice; vice-president of the American Academy of General Practice of Maryland; veteran of World War I; associated with Bon Secours Hospital and St. Agnes Hospital, where he died June 3, aged 59, of uremia and gastrointestinal hemorrhage.

Petrie, Scott T., Chicago; Harvey Medical College, Chicago, 1904; died in St. Mary of Nazareth Hospital May 13, aged 82, of cancer.

Pettie, Foster Blodgett, Corona, N. Y.; Howard University College of Medicine, Washington, D. C., 1926; died in the Queen's General Hospital, Jamaica, June 13, aged 58.

Phillips, Harry Boyd, Rochester, N. Y.; University of Buffalo School of Medicine, 1915; died June 2, aged 65, of cancer of the prostate.

Pilosi, Edward Mario ✦ Jamaica, N. Y.; St. Louis University School of Medicine, 1934; served on the staff of the Queens General Hospital; died June 10, aged 49, of acute coronary occlusion.

Pratt, Robert Boyd ✦ Bellefontaine, Ohio; Jefferson Medical College of Philadelphia, 1910; member of the founders group of the American Board of Surgery; veteran of World War I and was decorated by the French government with the Croix de Guerre; past-president of the Logan County Medical Society; on the staff of the Mary Rutan Hospital for many years; died June 4, aged 70, of cerebral hemorrhage.

Pressey, Harold Elbert, Bangor, Maine; Harvard Medical School, Boston, 1930; certified by the National Board of Medical Examiners; veteran of World War II; interned at the Boston City Hospital; on the staff of the Eastern Maine General Hospital; died June 10, aged 52, of acute coronary thrombosis.

Quillin, Lawrence Jacob, San Gabriel, Calif.; Northwestern University Medical School, Chicago, 1910; died in St. Luke's Hospital, Pasadena, March 4, aged 70, of cancer of the lung.

Remington, Paul Archibald ✦ Spokane, Wash.; Milwaukee Medical College, 1911; specialist certified by the American Board of Otolaryngology; past-president and secretary of the Spokane County Medical Society; fellow of the American College of Surgeons; served on the staffs of the Booth Memorial, St. Luke's, and Sacred Heart hospitals; died June 4, aged 69, of congestive heart failure and hypertension.

Rogers, Platt Harrison, West Haven, Conn.; Yale University School of Medicine, New Haven, 1912; member of the Connecticut State Medical Society; veteran of World War I; formerly member of the board of health; died in the Veterans Home and Hospital, Rocky Hill, June 2, aged 67, of bronchopneumonia, cerebral hemorrhage, and pyelonephritis.

Rothschild, Daniel Leslie, Irvington, N. J.; Cornell University Medical College, New York City, 1930; member of the Medical Society of New Jersey; veteran of World War II; on the staff of the Beth Israel Hospital in Newark, where he died June 10, aged 50, of myocardial infarction.

Schaefer, Arthur C. ✦ Buffalo; University of Buffalo School of Medicine, 1905; member of the American College of Radiology; served at the Mexican Border; veteran of World War I and was cited by Gen. John J. Pershing for "exceptional meritorious and conspicuous service"; for many years deputy health commissioner of Buffalo; served on the board of visitors of the Ray Brook (N. Y.) State Tuberculosis Hospital; died in the Millard Fillmore Hospital June 1, aged 74.

Schlossstein, Adolph George ✦ St. Louis; Washington University School of Medicine, St. Louis, 1894; assistant clinical professor emeritus of obstetrics and gynecology at his alma mater, where he joined the faculty in 1901; served on the staffs of the Barnes and St. Louis Maternity hospitals; died May 23, aged 84.

Scott, Wood Henderson ✦ Baton Rouge, La.; Louisiana State University School of Medicine, New Orleans, 1938; veteran of World War II; served as medical director of the state department of welfare; died in Our Lady of the Lake Hospital May 23, aged 52, of cerebral thrombosis.

Selig, Rudolf, New York City, Universität Heidelberg Medizinische Fakultät, Baden, Germany, 1911; member of the Medical Society of the State of New York; died in the West Hill Sanitarium June 5, aged 71.

Seligman, Albert E. ✦ Staten Island, N. Y.; Universität Heidelberg Medizinische Fakultät, Baden, Germany, 1916; member of the American Academy of Ophthalmology and Otolaryngology; specialist certified by the American Board of Otolaryngology; on the staffs of the Willbrook State School, Richmond Memorial, and St. Vincent's hospitals; died June 17, aged 66, of leukemia.

Sherwood, Marcel Wesley ✦ Temple, Texas; University and Bellevue Hospital Medical College, New York City, 1906; member of the American Association for the Surgery of Trauma; specialist certified by the American Board of Surgery; fellow of the American College of Surgeons; served on the staffs of the Gulf, Colorado and Santa Fe Hospital and Scott and White Hospital, where he died June 3, aged 74.

Sipman, Harold Irwin ✦ Oakland, Calif.; University of California School of Medicine, San Francisco, 1934; interned at Highland Hospital of Alameda County; on the staff of the Peralta Hospital; member of the American Proctologic Society; died June 20, aged 47.

Skoller, Julius ✦ Venice, Calif.; Loyola University School of Medicine, Chicago, 1940; interned at the Los Angeles County Hospital; veteran of World War II; on the staff of the Santa Monica (Calif.) Hospital; died in the Mount Sinai Hospital Los Angeles May 27, aged 42, of coronary thrombosis.

Smith, Charlotte Dodd Stewartson ✦ Manchester, N. H.; Tufts College Medical School, Boston, 1900; died May 30, aged 92.

Smolt, Lillian Alberta Polhamus ✦ Ventura, Calif.; Rush Medical College, Chicago, 1928; member of the staffs of the Ventura General Hospital and the Foster Memorial Hospital, where she died June 13, aged 55, of chronic glomerulonephritis and uremia.

Solter, Harry Christian, Sweetsprings, W. Va.; University of Maryland School of Medicine, Baltimore, 1899; died June 6, aged 79, of coronary thrombosis.

Spitzig, B. Louis, Cleveland; St. Louis University School of Medicine, St. Louis, 1910; member of the staff of St. John's Hospital; died in Lakewood, Ohio, June 11, aged 70, of coronary thrombosis.

Stewart, Charles Eugene, La Canada, Calif.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1895; fellow of the American College of Physicians; formerly associated with the Battle Creek (Mich.) Sanitarium; died May 24, aged 88.

Stiles, Henry Ranney, Lieut. Colonel, U. S. Army, retired, Louisville, Ky.; Yale University School of Medicine, New Haven, Conn., 1888; veteran of World War I; entered the medical corps of the U. S. Army in 1892 and retired July 1905; returned to active duty in 1915 and relieved from active duty in March, 1922; service member of the American Medical Association; died in the Kentucky Baptist Hospital May 20, aged 90, of heart disease.

Stillson, Austin Jeremiah ✦ Binghamton, N. Y.; Medico-Chirurgical College of Philadelphia, 1901; for many years county coroner; during World War I a draft board medical examiner and during World War II served on Selective Service Board 441; associated with the Binghamton City Hospital and the Our Lady of Lourdes Memorial Hospital; died in Windsor June 7, aged 77, of cerebral hemorrhage.

Swackhamer, Chester Ray ✦ Globe, Ariz.; Rush Medical College, Chicago, 1913; past-president of the Arizona State Medical Association of the Southwestern Medical Association, and the Gila County Medical Society; for many years chief surgeon of the Magma Copper Company and Magma Railroad of Superior; died June 8, aged 71, of arteriosclerotic heart disease.

Test, William Brantingham, Memphis, Tenn.; University of Rochester (N. Y.) School of Medicine and Dentistry, 1931; certified by the National Board of Medical Examiners; member of the American Trudeau Society; service member of the American Medical Association; associated with the Veterans Administration Hospital as assistant chief, tuberculosis section; died May 25, aged 54, of a heart attack.

Travis, William Barrette, Kentwood, La.; Medical Department of Tulane University of Louisiana, New Orleans 1902; on the staff of the Beacham Memorial Hospital in Magnolia, Miss.; died June 13, aged 82, of pulmonary embolism.

Trotter, William ✦ Troy, N. Y.; Albany (N. Y.) Medical College, 1912; served in France during World War I; on the staffs of the Leonard Hospital and the Samaritan Hospital, where he died June 18, aged 69.

Tyndall, Martha Winifred ✦ Westfield, N. J.; University of Vermont College of Medicine, Burlington, 1933; at one time a member of the state board of health; served on the staffs of the Muhlenberg Hospital in Plainfield and the Rahway (N. J.) Memorial Hospital; died June 22, aged 62, of multiple myeloma.

Wagner, Joseph Ralph, Palacios, Texas; Rush Medical College, Chicago, 1895; past-president of the school board; for many years city health officer; on the staff of the Bay View General Hospital, where he died May 28, aged 87, of cerebral thrombosis.

Warmer, Charles Andrew ✦ Redondo Beach, Calif.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1903; fellow of the International College of Surgeons and the American College of Surgeons; served on the staff of the Presbyterian Hospital–Olmsted Memorial in Los Angeles; died April 9, aged 80, of coronary occlusion.

Wescott, Royal James ✦ Everett, Wash.; University of Wisconsin Medical School, Madison, 1936; veteran of World War II; member of the staffs of Providence and General hospitals; died June 4, aged 47.

Westcott, Niles ✦ Oak Lawn, R. I.; Yale University School of Medicine, New Haven, Conn., 1909; member of the American Psychiatric Association; served as assistant superintendent of the Rhode Island Hospital and the Butler Hospital, both in Providence; died in Warwick May 31, aged 76, of diabetes mellitus and arteriosclerosis.

Wharton, James Osman ✦ McAllen, Texas; Physio-Medical College of Texas, Dallas, 1906; member of the American Academy of General Practice; served as secretary of the Hidalgo-Starr Counties Medical Society; city health officer; member of the staff of the McAllen Municipal Hospital, where he died May 27, aged 77, of pulmonary emphysema and myocardial infarction.

Wheeler, Samuel Edward, Columbia, S. C.; Medical College of South Carolina, Charleston, 1913; veteran of World War I; died in the Columbia Hospital June 4, aged 67.

Wilkerson, Jesse Bert ✦ Brevard, N. C.; Memphis (Tenn.) Hospital Medical College, 1906; on the staff of the Transylvania Community Hospital; died April 28, aged 75, of Hodgkin's disease.

Wilson, Norman Dickey ✦ Jackson, Mich.; Georgia College of Eclectic Medicine and Surgery, Atlanta, 1913; associated with the W. A. Foote Hospital; died June 13, aged 85, of acute pulmonary edema.

Wolf, Roy Milton, Canon City, Colo.; Kansas City (Mo.) University of Physicians and Surgeons, 1921; died May 19, aged 75.

Wood, Wilson Guyon, New York City; Columbia University College of Physicians and Surgeons, New York City, 1906; served in France during World War I; for many years associated with the New York Hospital; died in the Manhattan General Hospital June 17, aged 77, of congestive heart failure.

Woomer, Albert, Cashtown, Pa.; Kentucky University Medical Department, Louisville, 1904; an associate member of the American Medical Association; also a lawyer; died in the Annie M. Warner Hospital May 28, aged 82, of cerebral thrombosis.

Wronker, Harry ✦ Rochester, N. Y.; Long Island College Hospital, Brooklyn, 1915; member of the American Academy of General Practice; veteran of World War I; member of the medical board of the Jewish Home and Infirmary and the Highland Hospital, where he died June 7, aged 64.

Young, Charles Houston ✦ Philadelphia; University of Pennsylvania Department of Medicine, Philadelphia, 1906; veteran of World War I; died in the Presbyterian Hospital May 26, aged 77.

Young, Frank Walker, Colonel, U. S. Army, retired, San Antonio, Texas; Medical College of Alabama, Mobile, 1912; service member of the American Medical Association; veteran of World War I; entered the medical corps of the U. S. Army as a first lieutenant in January, 1920; rose through the various ranks to that of colonel in July, 1943; retired May 31, 1945; died in the Brooke Army Hospital, Fort Sam Houston, April 18, aged 67, of encephalomalacia.

Young, James Clint, Jonesboro, Ark.; University of Nashville Medical Department, 1891; Vanderbilt University School of Medicine, Nashville, Tenn., 1891; on the staff of the St. Barnard Hospital, where he died April 24, aged 90.

Zee, Urban Herbert ✦ Mankato, Minn.; Creighton University School of Medicine, Omaha, 1937; veteran of World War II; medical director of the Mankato Rehabilitation Center; on the staffs of St. Joseph and Immanuel hospitals; died March 28, aged 44.

Zuckerman, Louis Herman, New York City; University and Bellevue Hospital Medical College, New York City, 1907; member of the Medical Society of the State of New York; retired chief of the Bronx Bureau of Contagious and Infectious Diseases, New York City Health Department; died in the Flower and Fifth Avenue Hospitals May 13, aged 70, of Parkinson's Disease.

FOREIGN LETTERS

AUSTRIA

Early Diagnosis of Tubal Carcinoma.—At the meeting of the Austrian Society for Gynecology and Obstetrics in June, J. Froewis and H. Kremer reported on a patient in whom a definite diagnosis of tubal carcinoma was established by clinical observation and by cytological examination. A. Halter stressed the significance of a clear amber vaginal discharge in diagnosing tubal carcinoma. A 60-year-old woman with postclimacteric bleeding was admitted to the speaker's ward. Colposcopic and palpatometric findings were normal, but curettage showed histological evidence of an atrophic endometrium. The patient left the hospital. A follow-up examination was made six weeks later. A typical clear amber discharge and a negative cytological examination were noted. Despite the negative findings, a laparotomy was performed because of the presence of a typical carcinomatous discharge. Bilateral carcinoma, limited to the tubal wall, was found. The tubes were only moderately enlarged, but they were completely occluded. St. Skamnakis said that, unfortunately, the typical amber discharge is present in only 20% of the patients with tubal carcinoma. Unilateral cramp-like pain in the lower abdomen and bleeding are more frequent findings. These symptoms, associated with palpable swellings of the adnexa, however, may lead to a false diagnosis of pelvic inflammatory disease and prolonged conservative treatment.

Roentgenography of the Breast as Test for Pregnancy.—At the same meeting, K. Fochem and G. Narik said that the female breast shows changes of the tissue, not only during pregnancy but also during the menstrual cycle. These changes are histologically characterized by budding of the lactiferous tubules. Systematic examinations were carried out during the menstrual cycle and pregnancy. The roentgenogram of the normal breast shows a fine, marble-like pattern. The delicate ramifications of the septums of the connective tissue include homogenous parenchymatous areas. The roentgenographic changes in the breast during the menstrual cycle are minimal. During pregnancy, on the other hand, a characteristic thickening of the septums of the connective tissue and clouding of the parenchyma are observed. This is of diagnostic importance because the earliest of the changes can be recognized four weeks after conception. In 104 patients with early, doubtful, and ectopic pregnancies or with some type of tumor, a definite diagnosis was established in 97. A false-positive reading was made in three patients; in two, diagnosis could not be made because the breasts were too small; and in two, the changes were associated with a corpus luteum cyst. Owing to the high degree of correlation, roentgenography of the female breasts was recommended as test for pregnancy.

R. Bayer said that roentgenographic changes in the female breast ranged from a demonstrable delicate marking in the structure of the connective tissue of the breast in the phase of hormone deficiency (menopausal breast) through an increasing swelling of the corpus fibrosum in the phase of luteinizing hormonal activity of the marked swelling in the breast during pregnancy. Knowledge of these changes is important in diagnosing diseases of the mammary glands and of the breast tumors. The speaker stressed the fact that temporarily and quantitatively increased hormonal secretions (as in monophasic cycles or in phases of hyperfollicular internal secretion) give findings that are difficult or impossible to distinguish from the roentgenograms of the breasts made during pregnancy. The speaker doubted, therefore, that the practical evaluation of roentgenograms of the female breast as a test for pregnancy is possible.

COLOMBIA

Tuberculosis in Colombia.—At the meeting of the 11th Pan-American Congress of Tuberculosis last May at Medellin, Abad and co-workers reported on the 25-year-old campaign against tuberculosis in Columbia. Before 1932 there was no tuberculosis hospital in the country. Now there are 2,355 beds in 14 such hospitals. It has been estimated that about 20,000 persons have tuberculosis in this republic of nearly 13 million inhabitants. In 1945 there were 40 deaths per 100,000 from this cause. Ten years later the figure had dropped to 24.8. In 1948 the morbidity was 160 per 100,000 and in 1955 about 100. The highest incidence is found in the 20-to-30-year-old age group, where it is 110 per 100,000, and the lowest incidence is in the 10-to-14-year-old age group, where it is 20 per 100,000. In the over 40-year-old age group the incidence is 80 per 100,000. Clinicoanatomic types of the disease were found to differ quantitatively, depending on where the examinations were made. At tuberculosis dispensaries the distribution was minimal cases, 22%; moderately advanced, 34%; and far advanced, 44%. At institutions where tuberculosis investigation was compulsory, the distribution was minimal, 40%; moderately advanced, 48%; and far advanced, 12%. In Colombian mortality tables, tuberculosis is in the 17th place, but in first place are deaths from unknown causes. The authors believe that tuberculosis must undoubtedly be a major component of this category.

At the same meeting, Tovar-Acosta of Bogotá read a paper based on 2,674 patients admitted to the Hospital Sanatorio Santa Clara during the years 1952-1956. Of these patients, 87% had tuberculosis. Only five patients (0.21%) had had BCG vaccination; 9%

The items in these letters are contributed by regular correspondents in the various foreign countries.

mentioned contact with a human source of infection. The speaker believed this low figure was due to poor epidemiologic survey methods. A positive serologic test for syphilis was found in 5% of the tuberculous patients. The symptoms were grossly parallel to the severity of the disease, as classified by the standards of the United States Tuberculosis Association, but there were many far advanced cases with slight symptoms and a few minimal ones with severe symptoms. Far advanced disease was found in 53% of the patients, moderately advanced in 31%, and minimal in 16%. The symptoms were slight in 23%, moderate in 34%, and severe in 43%. These figures are similar to those found in other tuberculosis institutions in this country. They show that the diagnosis is not being made early enough. Active tuberculosis was present in 80% of patients and positive sputum was present in 61%. Lack of natural resistance in Colombians was demonstrated by the prevalence of diffuse lesions in one or both lungs (68%). Both diffuse and localized lesions were more common in the right lung. The preponderance of caseous pneumonic lesions (57%) over all others without cavity formation (43%) also indicates a lack of resistance.

Complications were encountered in 25% of cases, including 6% laryngeal, 4% pleural, 3% intercurrent diseases, 2% intestinal, and 10% genitourinary and nervous system involvement and others. The hospital mortality (24%) could be blamed on poor treatment, but the speaker believes this is due, mainly, to lack of sound preventive measures. Treatment has been useless in the 53% of the entire series who left the hospital while their disease was still active.

INDIA

Acetazolamide.—S. N. Sen Gupta and co-workers (*J. Indian M. A.* **28**:11, 1957) gave acetazolamide by mouth to 43 patients for whom a diuretic drug was indicated. Of these, 29 had heart disease, 7 had hepatic edema, 4 had nephrotic edema, and 3 had nutritional edema. The daily dose was 125 to 250 mg. according to the age of the patient and was given for three consecutive days. If the response was good it was continued for four more days. Good diuresis developed in 23 patients. The response varied in the different groups of patients; 65.5% of all cardiac patients responded well to the drug and 83% of those with cor pulmonale showed improvement. One patient besides showing a good diuresis also had relief from anoxic symptoms. Of the patients with hepatic edema, only 2 (29%) responded well; 14 patients in the whole series showed toxic side-effects, and 3 of these died in coma. Three of these patients suffered from hepatic cirrhosis and one had gross nutritional edema with possible involvement of the liver. Twenty-one patients were given a mercurial diuretic parenterally before or in place of acetazolamide treatment for comparison. The mercurials were on the whole better diuretics, and their action was probably potentiated by the other drug even when given 48 hours previously. The authors concluded that acetazolamide has a definite place in the treatment of heart failure and may be regarded as an alternative or adjuvant to mercurial diuretics in the treatment of this condition, but it is definitely dangerous in patients with chronic liver disease.

Detection of Ovulation.—P. N. Wahi (*J. Indian M. A.* **28**:12, 1957) stated that their previous study of vaginal smears, endometrial biopsy specimens, and urinary pregnandiol led them to conclude that the changes indicative of ovulatory and anovulatory cycles were clearly observed from the 14th to 26th day in a regular menstrual cycle of 28 to 30 days. They therefore believed that a single vaginal smear on the 24th to 26th day would assist in determining the nature of the cycle. The presence of urinary pregnandiol may be considered as a direct evidence of progesteronic activity (ovulation). A concurrent study was undertaken of single vaginal smears (premenstrual), endometrial biopsy specimens, and quantitative estimation of urinary pregnandiol from 80 sterile women. Cases of primary sterility with a normal menstrual cycle of 28 to 30 days were selected. Only one smear was taken on the 24th to 26th day. An endometrial biopsy specimen was obtained on the same day, and the chemical estimation of urinary pregnandiol was done in a 24-hour specimen. The results showed that ovulatory smears corresponded well with histological findings and pregnandiol secretion in 85.4% of the patients. Histological examination failed in 8.3% and cytological examination failed in 2.08% of the patients with an ovulatory cycle. In those with an anovulatory cycle, 64.3% of the smears were in agreement with the biopsy findings and urinary pregnandiol. Histological examination failed to indicate an anovulatory cycle in 21.4% of the patients, and cytological examination was unsuccessful in 14.3%. The authors concluded that the single vaginal smear method offers a fairly accurate method of determining the presence or absence of ovulation. The advantage of this method is that it is simple, relatively quick, inexpensive, and can be used on a large scale.

Public Health in Mysore.—The Minister of Health in Mysore, while outlining his program for the second Five-Year Plan period, said that the best form of rendering preventive and curative services in rural areas was by establishing health units where those two services could be combined. With this end in view, he proposed to start 102 primary health units. The government accepted the plan of operations drafted by the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) whereby those two organizations would provide two experts in maternity and child welfare and nursing administration and would supply the equipment necessary for various welfare centers in the state. The two experts had already reported and were engaged in a survey of maternal and child health services, including pediatrics, available in the state. Nursing facilities were also being surveyed. WHO and UNICEF had already supplied much equipment. Under this scheme it was contemplated to open two laboratories for chemical and food analysis. These laboratories would serve not only medical and public health departments but also were

open to medical practitioners in the area to facilitate early diagnosis and proper treatment. The bed strength in the existing health unit dispensaries was proposed to be increased by 250 beds. Five more district laboratories to undertake bacteriological, pathological, and chemical examinations were proposed to be established.

Campaign Against Substandard Drugs.—The Drug Standard Control in Bombay state continued to make steady progress in the first quarter of 1957. The intelligence branch attached to the Drugs Control Administration was engaged in the investigational work relating to the manufacture and sale of spurious drugs. During the quarter under report, 62 investigations were made, 24 prosecutions were launched for various offenses, and 4 convictions were obtained. Large quantities of drugs were destroyed because they were not of standard quality. Of 1,303 samples tested, 248 were of substandard quality. There were 58 licenses for manufacturing nonbiological products, 597 licenses for selling nonbiological products, 45 licenses for manufacturing biological products, and 343 licenses for selling biological products granted during the quarter under review. In the same period, 126 applications for licenses were rejected, 86 licenses were revoked, and 112 manufacturing premises and 2,063 selling premises were inspected. The additional staff recently authorized for the Drugs Control Administration will help to stabilize the control of drug standards in all parts of the state.

Xeroderma Pigmentosum.—Behl and Sachdev (*Ind J. Dermat. Venereol.* 23:2, 1957) stated that xeroderma pigmentosum is a rare dermatological entity and they were unable to find any published records of this disease occurring in India. They reported three cases which are the first probably to be seen in dark-skinned patients. The first was a boy aged 17 years, an only child. He started with freckles on his face at the age of 10 years and came to the hospital for a tumor on his face. His face, the upper part of his chest, and his hands showed freckles, telangiectasia, and atrophic areas resembling senile skin. There was a typical epithelioma on the right side of his nose which proved to be a squamous celled epithelioma. A few keratotic nodules were present on his face and chest. The second case was a boy aged 11 years who started getting freckles on his face, chest, and forearms at the age of 18 months. Later atrophic areas and telangiectasis appeared. At the time of examination, his whole body was involved with dark pigmented patches and freckles, stellate telangiectasia, atrophic areas, and keratotic nodules. For three months prior to admission an epitheliomatous lesion had been developing on his left forearm. His left eye showed keratitis and blepharitis with complete loss of vision. This patient is the second of five children. The third case was the fourth child of the same parents who since the age of 2 years had had freckles on his face, neck, hands, forearms, and legs. A few areas of atrophy and telangiectasis were also present. He was 4 years old at the time of examination and no lesion resembling a tumor was seen. The first two cases were referred to the surgical department for excision of the epithelioma. The prognosis is grave in all these cases.

Action of Local Anesthetics on the Uterus.—Y. K. Sinha (*J. Indian M. A.* 29:1, 1957) stated that cocaine and procaine have a stimulating action on the smooth muscle of the uterus. He compared local anesthetic action of such other agents as lignocaine and cinchocaine on the uterus. All experiments were carried out in vitro. The stimulant action of local anesthetics on the uteri of cats, rabbits, and guinea pigs was confirmed. This effect seems to be due to a direct action on the muscle, as it is not antagonized by atropine, mepyramine, F 933, or hexamethonium. The stimulating effect is reduced by lowering the concentration of calcium ions in the Tyrode solution. Thus it may be related to ionic changes in the muscle membrane. The stimulant action is not related to the local anesthetic activity. Procaine, however, failed to stimulate the nonpregnant uteri of guinea pigs and the immature uteri of rabbits.

SWITZERLAND

Symposium on Aldosterone.—The University Clinic for Therapeutics organized the First International Symposium on Aldosterone in June. The lectures and discussions will be published in detail in a special volume by Churchill Ltd., London. Moonlenaar and Querido (Leyden) described a new method for the physicochemical determination of aldosterone, based on the colorimetric reaction of 2-4-dinitrophenylhydrazine with aldosterone. The method is reliable and the absolute values correspond to those obtained by the method of Simpson and Tait. Neher (Basel) consistently found aldosterone in large amounts in three patients with Conn's syndrome; in one patient the corticosterone level was equally high. The content of aldosterone in the adrenal tissue was normal in two patients with Cushing's syndrome, whereas cortisone and hydrocortisone levels were increased. Analyzing the tissue of one patient with almost complete necrosis of the adrenals, but with the preservation of the zona glomerulosa, Neher found an abundance of aldosterone. This confirms the belief that aldosterone is synthesized in the glomerular zone.

Desaulles (Basel) compared the biological effects of aldosterone in adrenalectomized rats with a proprietary glucocorticoid preparation (Cortexone) and hydrocortisone. Contrary to the observations in man, aldosterone improved the delayed diuresis of adrenalectomized animals. The action of aldosterone on the connective tissue is also different from that of Cortexone. The actions of aldosterone resembled, in particular circumstances, more those of hydrocortisone than those of Cortexone. Gross (Basel) stated that the maintenance dose of synthetic d-1-aldosterone is 1.7 to 2 times larger than that of the natural aldosterone. He concluded that the therapeutic margin of aldosterone is wider than that of Cortexone. He stated also that less potassium was lost by treatment with aldosterone than by treatment with Cortexone. Furthermore, aldosterone produces hypertension only

when the doses are relatively much larger than those of Cortexone. Giroud (Montreal) reported that, in a series of experiments in vitro, aldosterone is essentially produced in the glomerular zone in rats and oxen, whereas hydrocortisone is synthetized in the fascicular zone and corticosterone in both. Extracts of the anterior lobe of the pituitary stimulate chiefly the production of hydrocortisone, whereas those of the posterior lobe have a marked influence on the secretion of aldosterone. Pure vasopressin and oxytocin are inactive. A contaminant must, therefore, be contained in these extracts.

Simpson and co-workers (London) studied the metabolism of aldosterone marked with tritium (H^3) in position 16. Aldosterone appeared to be more rapidly metabolized than hydrocortisone. The authors believe that the daily secretion of aldosterone is about 200 Gm. They found aldosterone in the urine in an easily hydrolyzable form at pH 1. At present, the structure of the conjugate of aldosterone is unknown, but preliminary experiments suggest a conjugation with a sulfate in position 18 or 21. This product, however, corresponds only to 5% of the amount of aldosterone produced daily by the organism. Bartter (Bethesda, Md.), stated that he produced variations in the intravascular space in experimental animals either by infusions of concentrated albumin or by repeated bleedings. The variations of aldosteronuria observed supported the hypothesis that changes in the intravascular space regulate aldosterone production. These same changes seem also to influence the aldosteronuria in the cases of secondary hyperaldosteronism. Muller (Geneva) had studied the daily aldosterone cycle in normal subjects. The elimination of aldosterone, which is increased during the day, depends essentially on the upright position and the daily activity. The deposit of sodium does not seem to influence the nyctohemeral cycle of aldosterone production. Patients with a hypophysial deficiency show daily rhythmic aldosterone fluctuations in the level only when given cortisone and when erect and active.

Garrod (London) stated that adrenal hypertension and motor paralysis are predominant symptoms of Conn's syndrome. All the patients had hypokalemia, hypernatremia, alkalosis, polyuria, hyposthenuria, and alkalinuria. Histological examinations of the kidney revealed vacuolation of the renal tubules. The secretion of aldosterone is variable, but hypokalemia is generally associated with extremely low aldosterone levels. The absence of edema remains a mystery. Stanbury (Manchester) reported that hypokalemia leads to renal insufficiency and, on the other hand, renal diseases may be complicated by hypokalemia. Renal insufficiency may become worse if associated with a depletion of potassium. Primary aldosteronism as well as Cushing's disease may produce hypokalemia associated secondarily with renal insufficiency. Depletion of sodium in patients with renal insufficiency produces, in its turn, secondary hyperaldosteronuria, which makes the depletion of potassium worse. Mach (Geneva) discussed a 37-year-old woman with idiopathic edema associated with hyperaldosteronuria. He was able favorably to influence the clinical course by repeated water overload. Wolff (Munich) stressed the disastrous effects of physical exercise on the retention of sodium by the increase of aldosterone in patients with secondary hyperaldosteronism associated with hepatic cirrhosis and cardiac insufficiency. When the cardiovascular condition is improved by rest and cardiotonics, aldosterone production decreases and the edema disappears.

UNITED KINGDOM

Tuberculosis in Pathology Laboratory Workers.—Tuberculosis as an occupational hazard of pathology laboratory workers was investigated by Reid (*Brit. M. J.* 2:10, 1957). Although the possibility of aerial dissemination of micro-organisms from sectioned pathological material has been demonstrated, the ultimate test is the demonstration of a higher incidence of tuberculosis among those working in pathology laboratories than among other comparable groups of workers. Reid first analyzed the claims for sick pay under the Health Service and found that pathologists, like thoracic surgeons and chest physicians, had claim rates for incapacitating pulmonary tuberculosis in excess of those of other medical workers and that laboratory technicians had much higher rates than other medical auxiliaries. Because of possible fallacies in interpreting the data, Reid investigated the incidence of tuberculosis among the staffs of 345 laboratories in the Public Health Laboratory Service over a period of five years. It was found that the incidence of incapacitating pulmonary tuberculosis was, for different laboratory categories adjusted for age and sex, two to nine times greater than the corresponding rates in the country as a whole. The rates for pulmonary tuberculosis among pathologists and technicians were found to be two to three times greater than those of post-office workers of similar age and social and economic status.

The highest rates occurred among workers employed in laboratory and mortuary tasks, exposing them to the risk of contact with infected material; the incidence was highest in the second and third years of employment. In these groups the attack rate was three times that of nonexposed laboratory staff. Preemployment examination showed that young laboratory recruits had no unduly frequent previous contact with tuberculous subjects. The possibility was investigated that these high tuberculosis morbidity rates were due to factors such as overcrowding, poor physique, and better reporting than elsewhere, but these factors were not found to be significant.

Another study suggested unexpected sources of tuberculous infection in laboratory workers. Tomlinson (*Brit. M. J.* 2:15, 1957) showed that infected air-borne particles are released when screw-capped bottles containing slant cultures are opened. This is probably due to the film of fluid round the rim of the bottle becoming contaminated when the culture is inoculated. Bacteria then grow in this site during incubation and are released in a shower of fine infective particles when the bottle is opened. Another source of infection occurs when screw-capped bottles are centrifuged. This results in contaminated spray being spread over a distance of 3 ft. or more from the centrifuge. Other possibilities of infection are spray arising from

incised tuberculous material and the cage dust of tubercle-infected laboratory animals. This suggested that exposed laboratory staff should be tuberculin tested and BCG vaccination offered to negative reactors, that periodic roentgenograms of the chest be taken, and that potentially infected material should only be handled by experienced staff members under a well-ventilated hood.

Professional Secrecy.—The traditional policy of professional secrecy is likely to be reaffirmed at the British Medical Association's annual meeting at Newcastle-upon-Tyne. Prof. A. P. Thomson points out in the July issue of the *Practitioner:* "In a hundred years no allegation of infamous conduct involving a breach of the rule of secrecy has ever been brought to the General Medical Council." If, however, a physician discovers evidence that warrants serious suspicion of murder or rape, he should, unhesitatingly, disclose it to the police because he has a duty to society as well as to his patient. Attempted poisoning should be reported. Unfortunately, a poisoner is rarely convicted on account of evidence obtained in the case of his first victim. It is not the duty of physicians to assist the police in the detection of minor offences. If, after a drunken brawl or other disturbance which has not entailed loss of life, the police are searching for offenders, it is not required that physicians report injuries which suggest that the patient has participated in the disturbance.

Dr. L. J. Witts says that the ban on the use of physicians' names in television and radio broadcasting cannot be supported, although it is part of the present policy of the General Medical Council and the B. M. A. Fan mail rarely includes requests for consultation. Most correspondence after broadcasting comes from the lunatic fringe. The public has no use for anonymous information. B. M. A. resolutions do not bind the profession, but physicians who break them are placed in an uncomfortable position.

Independent Health Service Proposed.—An independent British medical service was outlined at the British Medical Association's annual meeting. It may be an alternative to the National Health Service or work side by side with it. The scheme put forward by Dr. H. H. D. Sutherland consisted of the following proposals: 1. The service should be free from political party control. 2. It should be financed partly by contributions by the patient, partly through insurance, and partly by the government. 3. It would provide certain specified life-saving drugs free; other medicines would be paid for by the patients. 4. Participating physicians would have the right to engage in private practice. This would be encouraged by the existence of a list of free life-saving drugs and necessary dressings. 5. Physicians would possibly be paid on a fee-for-service basis. 6. The service should be under the control of a politically independent board or corporation responsible to the privy council. 7. Provision should be made for care of the old and poor without their having to pay. Summing up the advantages to the public, Dr. Sutherland said there would be a reduction in cost to the nation and a consequent reduction in the income tax. There would be greater freedom of choice of physician, an improved patient-doctor relationship, and a greater sense of responsibility in patients. Such a scheme would take at least five years to introduce.

Tranquilizers Causing Anxiety.—Physicians, worried about the possible coming of the perfect tranquilizer, warned of its probable evil social effects at the scientific meeting of the British Medical Association. Even the existing tranquilizers carry many dangers, including sudden death and various complicating illnesses. Dr. E. H. Kitching, of Manchester, told of the American druggist who had to put up a "sold out" sign. He had run out of tranquilizers and the queue outside his shop had to be sent away. Tranquilizers are big business. They have become a social habit in some communities. In 1956, American druggists filled about 30 million prescriptions for these drugs, compared with 10 million the previous year; 50,000 million tablets of one popular tranquilizer were sold in 1956. Physicians are finding that the performance of these drugs is much inferior to the claims made for them. In a survey of 8,200 patients with anxiety states, physicians reported that the benefit produced by tranquilizers was small compared with the dangers. There have been four deaths, including two suicides. One in five patients was made worse by taking the drugs. It was rare for patients to feel better beyond the first week or so. Dr. R. Orton, of Newcastle, said there was a difference in the reaction to these drugs in men and women. Women, especially if they used tranquilizers for long periods of time, gained much weight.

Dr. Louis Minski said that the danger of the perfect tranquilizer would be that the patient would be prepared to accept anything. The sexual pervert taking it would have no sense of guilt; married couples living in slums and overcrowded quarters would accept the conditions and children would be brought up in them. Prof. Charles Robb, of London, said the best tranquilizer of all is whisky. It is an extremely good drug for reducing postoperative pain and helping patients to sleep.

Physicians Oppose Drugs for Blood Pressure.—Sensible living is the way to avoid dying from high blood pressure. This was the advice given by a panel of experts at the British Medical Association's scientific meeting at Newcastle-upon-Tyne. So-called miracle drugs are not the answer. Physicians should stop frightening people. Most patients with high blood pressure have no need for fear, but fear can aggravate their condition.

Dr. Robert Coope, of Liverpool, said that the "normal sheep" could not be separated from the "hypertensive goats" by a couple of numerical readings. Most people with asymptomatic hypertension will be alive at 65 years of age or more. Even where there are such complications as minor strokes, the giving of drugs is often a substitute for proper care of the patient. The man consumed with ambition, the one who burns his candle at both ends, should learn some practical philosophy and accept his limitations. Dr. John Hunt, secretary of the College of General Practitioners, said the family physician should reassure the patient by pointing out that hypertensives live 20 or 30 years and that one-third of them die of something quite different.

The patient has to adjust himself to his high blood pressure as others have adjusted to various handicaps. There should be more sleep and quiet week ends without too much strenuous exercise. He lets his patients eat as much red meat as they like. There is no evidence that this increases the blood pressure. There is one antifear drug that has been known to man for centuries—alcohol. A glass of sherry or a whisky and soda before dinner, or a nightcap, is an accepted social custom and does not make a man feel like an invalid. The speaker did not believe that we are living in an age any more dangerous than those that have gone before, but the regular consumption of drugs, seducing people into a bogus tranquility in the midst of a crazy sort of life which they refuse to change, is at the root of most of our troubles. Prof. John McMichael, of London, said muscular activity tends to reduce blood pressure and that exercise in moderation is a good thing for hypertensive patients.

WORLD HEALTH ORGANIZATION

Poliomyelitis.—The Expert Committee on Poliomyelitis met in Geneva in July. Under the chairmanship of Sir Macfarlane Burnet (Australia), it has come out strongly in favor of large-scale trials of a new vaccine prepared from a living virus which has been attenuated so that it is no longer capable of causing the disease although it may be expected to provide lasting protection against it. The live-virus vaccine can be given orally instead of being injected. Preliminary trials of this vaccine carried out by several different research teams have failed to reveal any signs of illness or other harmful effects either in the persons vaccinated or in members of their families. The experts consider, therefore, that the vaccine may now safely be given larger-scale trials.

They do not, however, suggest that this vaccine should displace the Salk type of killed-virus vaccine in those countries where it is now being used or is about to be used. They believe rather that the new vaccine should be an adjunct to the present vaccine, though it might eventually replace it if that is found desirable or be a substitute for it where the use of the Salk vaccine is not feasible. If the proposed trials of the live-virus vaccine prove successful, it is hoped that the immunity it provides will be reliable and long-lasting and will result in the elimination or at least in a substantial reduction of the virulent strains of virus in circulation at present. The present killed-virus vaccine cannot achieve this kind of result. The committee emphasizes, however, that the most stringent precautions should surround proposed trials of the new vaccine. In order to prove its complete harmlessness it should first be given to limited numbers of selected groups of persons. Furthermore, the properties of the attenuated strains of virus used in the vaccine should be measured in a number of different laboratories. These trials should be accomplished on a voluntary basis and with the approval of the local authorities concerned. The object of the proposed trials of live-virus vaccine and the need for carrying them out are based on the belief that they may go far in further reducing the prevalence of poliomyelitis in the world.

Experience with Salk Vaccine.—The committee also reviewed the experience gained in those countries where killed-virus vaccine has been used. In France vaccination was not officially started before June 1, 1956. Several million doses were released, but, since most of them were exported, a close follow-up of results will be possible only for about 800,000 vaccinations. Of these, 100,000 had been given up to July 1, 1957, with negligible side-reactions. In Poland, the average mortality from poliomyelitis in the years 1951 to 1954 was 6.3% of the reported cases. More males (55%) than females (45%) caught the disease, and the highest incidence was in the group infancy to 4 years of age (78% of all cases). In 1957 Poland began to produce the vaccine, and in October it is planned to vaccinate 100,000 children in Warsaw and Lodz.

In Great Britain vaccination has not offered complete protection against poliomyelitis, as some cases of paralytic disease were observed in vaccinated children. After the incidents which occurred during the first large-scale vaccinations in the United States, the authorities decided to manufacture a modified form of the Salk vaccine, the type 1 Mahoney strain of virus being replaced by a less virulent one. In Canada, the lower incidence of poliomyelitis in the last two years has made it difficult accurately to evaluate the results of the vaccination program. In 1956, 11 cases of paralytic poliomyelitis were reported among a total of 1,860,000 vaccinated children and 136 cases in 2,140,000 unvaccinated children of similar age. In Southeast Asia the incidence of the disease has remained low. Cases among the adult population are almost unknown except among foreigners. In the United States, 15,400 cases occurred in 1956. This represents a rate of 9.2 per 100,000 population and is the lowest recorded since 1947. Because of the wide annual variations in incidence, it has not been possible definitely to attribute the low incidence in 1956 to the widespread use of vaccine (70 million persons were vaccinated). In Israel all children from 6 months to 3½ years of age were vaccinated between January and May, 1957. This was done because it was found that over 80% of paralytic cases occurred in that age group. Among emigrants up to the age of 40 years from Western Europe and the Americas it was possible to vaccinate 130,000 persons.

In the Union of South Africa vaccination campaigns began in 1955 and were continued through 1956 and 1957. During this period the country experienced a prolonged and severe epidemic, which, for the first time, affected Africans as much as people of European descent; but among the Africans the disease affected young children for the most part, while in the Europeans older children were also affected and there were many cases among adults. About 500,000 children have been vaccinated. In Russia there was a distinct rise in the incidence of the disease in 1955 (8 cases per 100,000 population). Available information indicated no reduction in 1956 or 1957. Young children under 7 years of age were most affected (85% of cases). In the spring of 1957, 80,000 children were vaccinated. In Sweden large-scale vaccination campaigns were begun in February, 1957, and 800,000 persons have been vaccinated. No cases of poliomyelitis after inoculation have been reported.

LAW DEPARTMENT

MEDICOLEGAL ABSTRACTS

Malpractice: Statute of Limitations.—The plaintiffs, husband and wife, filed an action for damages caused by the alleged malpractice of the defendant physician. From a judgment in favor of the defendant, the plaintiffs appealed to the district court of appeal, second district, division 3, California.

On June 15, 1952, the wife was injured in an automobile accident. She had been under defendant's care for about two years for a suspected gallbladder condition, and shortly after the accident she again engaged the defendant's services. She was placed in a hospital on three occasions, but at no time during the course of treatment did the defendant treat her for injuries suffered in the accident. From the time after the accident until the following January the plaintiff wife suffered from extreme pains in her head, dizziness, nausea, and impairment of vision. The defendant, however, attributed this condition to ailments from which she had previously suffered. Although x-rays were taken, they did not suggest to the defendent that the condition that was causing the wife's suffering was an accumulation of fluid that was creating brain pressure and injury to the optic nerves. The physician-patient relation between the plaintiff wife and the defendant was terminated Jan. 6, 1953, and on defendant's recommendation, she then consulted Dr. Seletz who informed the plaintiffs on Jan. 9 that there was an increased pressure within the wife's head due to a head injury and that he feared it was a surgical condition, but one he believed he could remedy. On Jan. 17, Dr. Seletz told the plaintiffs there was another test (an air study) that should be made and that this study would not be made without an understanding beforehand that if, in his opinion, surgery was indicated he had permission to proceed immediately. The plaintiffs agreed. When the wife entered the hospital on Jan. 17, a writing was prepared which stated in part: "Mrs. Jewell Calvin, Dr. E. Seletz, subdural hematoma—preoperative diagnosis, possible subdural hematoma." Dr. Seletz testified that the diagnosis was written by him and that he signed the paper. The plaintiffs signed a paper which read, in part: "preoperative diagnosis, possible subdural hematoma." This was over the signature of Dr. Seletz. On Jan. 19, the wife signed a paper which read, in part: "operation and anesthetic record . . . preoperative diagnosis, shaving of head." The wife testified that the papers were signed by her in blank. The papers containing the diagnosis, however, stated that the signers certified that the diagnosis was written in before the operation and Dr. Seletz testified that he wrote in the diagnosis, that he never operated without writing in the diagnosis, and that to the best of his knowledge it was written in before the plaintiffs' signatures were attached. The present action was filed Jan. 28, 1954.

The defendant contended that the action was barred by the one year statute of limitations. The plaintiffs, however, contended that the evidence was not sufficient to sustain the finding that they had knowledge of the facts constituting their cause of action more than one year prior to the institution of the action. The evidence showed that the information conveyed to the plaintiffs by Dr. Seletz before and after the operation was such that they must have known that the defendant had not made a correct diagnosis nor given the wife the care her condition required. The plaintiffs did not deny that Dr. Seletz made it clear to them on Jan. 19 and 20 that the defendant had made an incorrect diagnosis. The statute began to run when the plaintiffs acquired knowledge of the facts constituting their cause of action. The physician-patient relation was severed prior to that time and the defendant did nothing thereafter to interrupt the running of the statute or to estop him from relying on it. In the opinion of the court of appeals, the trial court could not reasonably have found that the plaintiffs did not have knowledge of the facts constituting their cause of action as early as Jan. 19, 1953. Since the action was not filed until more than a year later (Jan. 28, 1954) it was barred by the statute of limitations. Accordingly, the judgment of the lower court in favor of the defendant physician was affirmed. *Calvin v. Thayer, 310 P. (2d) 59 (Calif., 1957).*

Chemical Tests for Intoxication: Self-Incrimination.—From a conviction for driving a motor vehicle while under the influence of intoxicating liquor, the defendant appealed to the criminal court of appeals of Oklahoma.

The defendant testified that, following her arrest, she was taken to a room in the police station where she was told to blow her breath into a balloon, to walk a line, to pick up some coins, and to perform other manual tests. She said that she thought she had to do everything the officers told her to do because she was under arrest. She testified that the officers refused to allow her to make a telephone call for advice, failed to tell her of her right to counsel and to refuse to do the things demanded, and did not advise her that the evidence could be used against her. The prosecution offered no evidence to rebut that of the defendant. The court said that a confession of a defendant shown to have been induced by hope or promise of benefit or through fear is involuntary and inadmissible. The defendant's evidence that she performed the tests because of fear was not denied and must be given full credence. The tests were, therefore, not voluntarily performed.

The defendant contended therefore that the admission of evidence as to a drunkometer test and the other involuntary tests denied her the privilege against self-incrimination guaranteed by article II, section 21 of the Oklahoma constitution. The privilege against self-incrimination, said the court, was established in the common law to protect the individual against the employment of legal process to extract from his own lips an admission of his guilt. The cases from the vari-

ous states are uniform in holding inadmissible self-incriminating words forced from the lips of an accused or forced incriminating writings, but they are not uniform as to evidence obtained by use of bodily fluids of an accused gotten either while he was unconscious or when he was conscious but against his will. Likewise as to other forms of physical evidence. The reason for the rule that distinguishes between "real" and "physical" evidence is that where evidence is elicited from the lips of an accused or by writings, where such evidence is given either in fear of punishment or in hope of escaping punishment, such evidence is not admitted because experience shows that the accused is liable to be influenced by these motives, and such evidence cannot be relied on as guides to truth. This objection does not apply to evidence of the nature complained of in the present case, because no hopes or fears of the accused could change the physical facts one iota. The court therefore held that the admission of evidence as to the involuntary tests did not violate the defendant's privilege against self-incrimination.

The defendant also contended however that it was error to allow the officer who performed the drunkometer test to testify as to the results of the Harger color change test, which he obtained from reading the gasometer cylinder of the drunkometer, because he was not an expert in chemistry and was unable to independently work out the formula involved. In a prior Oklahoma case it was held that for the results of the tests to be admissible there should be the following: (1) proof that the chemicals were compounded to the proper percentage for use in the machine, (2) proof that the operator and the machine were under the periodic supervision of one who has an understanding of the scientific theory of the machine, (3) proof by a witness who was qualified to calculate the reading of the machine into the percentage of alcohol in the blood. The officer performing the test did not meet the third requirement, but that link was supplied by a physician who qualified as an expert. This expert testified that a person having the amount of alcohol in his blood that the defendant had would be under the influence of alcohol.

It must be recognized in giving the tests for the alcoholic content of the blood that the color-change test of both the Harger drunkometer, and the intoximeter (Forester) used by the highway patrol and mentioned by the defendant, require no knowledge of chemistry or mathematics, nor is it necessary to understand the meaning of the operations in order to obtain the percentage of blood alcohol reading. But it does require a chemist to make the further tests where the dehydrite tube and ascarite tubes are used in case of the drunkometer and magnesium perchlorate tube and the ascarite tube in case of the intoximeter. And it does require an expert witness to testify as to the meaning of the readings. That was done in this case. Certainly the drunkometer could not be cross examined as to the reliability of the reading, but there was ample opportunity to cross examine the operator as to whether an unused balloon was used for trapping the breath, whether the pipet for measuring the potassium permanganate and the separate one for measuring the sulfuric acid were clean, and whether the rubber tubes connecting the various parts were leak-proof, etc. It was only necessary to determine that the machine was in working order, that a careful reading was made, that the exact amount of chemicals was measured out, that the air was shut off at the instant the color change took place, and, after a course of instruction, that the operator was qualified to make the test in question. All this was done, also.

The court pointed out that it was not holding that a drunkometer test, standing alone, would be sufficient to sustain a conviction. Persons who observed the defendant following her arrest testified that in their opinion she was intoxicated. There was also testimony that she staggered off the straight line all four times she tried to walk it and that she had great difficulty in picking coins up from the floor. When given the Romberg test she swayed very badly. The court concluded that there was ample evidence to support the verdict of the jury. The judgment of conviction was accordingly affirmed. *Alexander v. State, 305 P. (2d) 572 (Okla., 1956).*

Malpractice: Patient's Fall from Examination Chair.— This was an action for damages for injuries caused by the alleged negligence of the defendant physician. The trial court sustained the defendant's general demurrer so the plaintiff appealed to the court of appeals division 1, Georgia.

The plaintiff suffered an eye condition which resulted in a partial loss of sight and went to the office of the defendant physician for treatment. In treating the plaintiff for the condition, the defendant had her sit in a chair which could be raised or lowered as desired. After placing a medicament in the plaintiff's eyes, he raised the chair and left the room. After having been left alone for about 30 minutes, the plaintiff attempted to get down from the chair, tripped, and fell. It was the plaintiff's contention that the defendant, knowing she had defective eyesight, was negligent in leaving her unattended, in a dangerous and exposed physical position, and in failing to warn her against attempting to get down from the suspended position without assistance.

Section 84-924 of the Georgia Code requires a physician to use reasonable care and skill in the practice of his profession, and ordinarily the question of whether a physician has used that degree of skill is a question for the jury. However, said the court, where from the allegations of the plaintiff's petition it is palpably clear that the injuries complained of were not caused by the failure of the physician to use reasonable care and skill but rather from the independent act of the plaintiff, the question should be decided as a matter of law where a timely general demurrer has been filed. The judgment of the lower court was accordingly affirmed. *Robinson v. Campbell, 97 S.E. (2d) 544 (Ga., 1957).*

MISCELLANY

AMERICAN MEDICINE ABROAD—TANSEN, NEPAL

Lou Hazam

This is the third of a series of on-the-scene reports from the "March of Medicine" production team, which is traveling around the world to film an hour-long television program on the work of American doctors abroad—the services they perform, the conditions they face, the personal satisfaction they receive in their unofficial roles as America's medical diplomats. The author, Mr. Lou Hazam, has written all but one of the "March of Medicine" scripts since the series started in 1952. In this article, he tells of the dedicated work of Dr. Carl Friedericks in Tansen, Nepal. Also on the "March of Medicine" itinerary are such places as Hong Kong, Sarawak, Burma, Korea, India, Ethiopia, Lebanon, Turkey, and Guatemala. The program, sponsored and produced by Smith, Kline & French Laboratories in cooperation with the American Medical Association, will be seen in color next spring over the NBC television network.—ED.

There is a good chance that we have found the American doctor who is serving in the most remote and inaccessible region of the world. We believe that that doctor is Dr. Carl Friedericks whom we visited in Tansen, Nepal.

North of India, in the towering foothills of the earth's highest mountains, the Himalayas, Dr. Friedericks cannot be reached by plane, train, car, or boat—but only by days of the most arduous climbing over steep and primitive mountain trails, fording streams, and crossing plains . . . two days, at least for the uninitiated, from the small, thatch-roofed town where the last conveyance, a rickety bus, deposits you.

First, to come by the route we followed, one must fly over the chain of mountains known as the Maha Bharat range to reach the capital of Nepal, which is Katmandu. This is an experience in itself. Recently, when late out of Burma I sought to rejoin the Smith, Kline & French "March of Medicine" crew which had already preceded me there, it called for rising at dawn in Calcutta, boarding an Indian Airlines plane, and setting out for an ancient crossroad of civilization, dating back to the time before Christ, known as Patna. Here the idea was to board another plane for Katmandu. In the sweltering heat of the airport, one waited three and a half hours for this departure, and finally—piloted by two handsome bearded Indian pilots—took off and pointed to the north.

What followed was, in a sense, a bright nightmare. All went well until we reached the mountains that since the dawn of man had stood as a formidable barrier between India and its neighbor. In vain did the pilot, skirting between the towering cliffs, seek to find his way over them, only to be frustrated by the mist that overhung them, hiding the highest peaks. He circled and tried again and again, to no use. Finally, he turned and made his way to an "airport" nearby. Airport? It was a flat field, with no runway, covered by solemnly grazing cattle. Undeterred, the pilot put his plane down with a jolt, as the cattle, frightened by the noise, ran for cover as we rolled in the direction of a thatched adobe structure that I supposed was the "terminal."

The faces of the people who quickly collected were strange and fascinating. We remained there for about 10 minutes, and then, as the rain began to fall in huge droplets, the pilot cried "Let's go!" It was easy to understand why, for if we stayed much longer we would be mired in a sea of mud and never be able to take off. Quickly he pulled out the stones he had placed under the wheels of the plane, and with a roar we were air-borne again.

This time it was clearing "upstairs." The plane banked in the direction of the mountains that loomed ahead and we now were apparently going to challenge them. In a moment they were on either side of us . . . ridge after ridge rising far above the wings of the plane in a succession of obstacles. Picking out a sort of valley path, the pilot wound his way through them, turning a corner occasionally and entering another pass, as all the while there unfolded all around us the most striking scenic grandeur—a splendor that was so all-enveloping, that one forgot to be afraid. At last we came over terraced slopes, planted to their very peaks, and then with a swoop we were over the major valley . . . the fertile plain, once a lake bed, on which the capital city of Katmandu had stood for centuries, and now appeared to come rushing toward us.

This much, compared to what was to follow later, was nothing. Only I did not know it then. Plans had already been made to depart for Tansen the following morning to film the medical work of Dr. Carl Friedericks. I had arrived just in time to secure a visa and join the party. (Yes, in Nepal one needs a visa to move from the Katmandu region to another part of the country. In short, one needs a visa to travel within the borders of the same country!) Preparations were significant. Food, water, bedding, mosquito nets, guide—all had to "laid on" before venturing forth into the very special world that lay ahead. I stood innocently by, suspecting nothing. We were to divide our crew. Two were to remain behind—Charles Paulton, our sound engineer, for lack of batteries and the difficulty of hauling his equipment in any case; and Mike Oppenheimer, our associate producer, to clear the way for future travel. Making the trip to Tansen were to be David Lowe, our producer, Ian Struthers and Geoffrey Gurrin, cameraman, and myself.

Next day, again at the crack of dawn, we took off from Katmandu for Pokhara. Once more—this time seated on bucket seats, the baggage piled at our feet—we rose from the valley which soon spread out below us and headed for the hills, which gradually grew more forbidding. After 30 minutes or so we reached and put down at Pokhara to deposit passengers and take on others, plus more baggage. Again the heat—suffocating. In a short while we emplaned once more, and this time, once we were up, the mountains put on a real show!

Apparently what we had been referring to as mountains before must have been merely giant molehills. For suddenly the clouds cleared, and there behind the highest dark range towered the hugest snow cov-

ered peaks I had ever seen . . . monster-sized mountains that sent a wave of excitement through the whole plane.

"There, look quickly," cried the steward. "Annapurna!"

Annapurna—26,492 ft. high! Was not this the mountain that struck fear into the hearts of even the most courageous mountain climbers? I wondered what madness had brought us anywhere near it, and while I tried to enjoy the view as long as it lasted, I was somewhat relieved when the clouds pulled their first-act curtain over it again.

And now we were at our last plane stop, Bhairahwa. Here was a village with the faint shadow of a road snaking away from the airport. We were still miles from our starting place, and what was needed now was a bus to carry us as far as it could, i. e., as far as roads went, before we set out by foot. Fortunately, Dr. Friedericks had received news of our plans by government wireless from Katmandu. An emissary, Earl Schmidt, long, strong, and lanky, showed up with a bus which must have been discarded by the Smithsonian Institution as too old, dating back most certainly to the beginning of the motor age. We piled in, not without doubts, and after some hand-cranking and motor coughing, we set off with four drivers! (I learned en route what they were for. One cleared the road of stony obstructions and tested the bridges; another constantly ran ahead to the nearest stream of water to fill the radiator; and the third spelled the driver and kept the motor lubricated with oil.)

It was a journey none of us will ever forget, and its end was as full of surprises as its beginning. For the village at which we ultimately found ourselves was huddled at the foot of mountains that almost surrounded it. Here in Butwal we were to move our luggage from the bus to the backs of porters, mountain climbers almost from the day of their birth.

To see these wiry men pack, to watch them lift the huge loads to their backs, supported by a strap that passed over their foreheads and then actually bend under the load and walk with the pack intact, left us all weak. So began the trek.

Never, as long as memory remains with us, will the two days that followed be lost to our family and friends. We were all city-born, desk-broken. To walk even to our cars was an effort. Now we were taking on mountains. The land rose gradually at first, then abruptly. Carefully we picked our way along, armed against the heat by big black umbrellas we had thoughtfully purchased on the way. In a matter of moments we left the last semblance of town behind us and were now enveloped, as the home-sitting poets put it, in the arms of nature.

And such arms! Stones the size of houses . . . paths suitable only for mountain goats . . . deep gorges . . . rushing mountain streams to be forded . . . and inevitably ahead, more of the same . . . and always up . . . up. Worn and weary beyond previous experience, the first night on the trail we spent in a rude hut where a nice woman, decorated by rings in her nose and gold jewelry in her ears, made us a Nepali dinner—hot as the chili of Mexico. We stretched out on mats under mosquito nets and slept until dawn.

Again we continued on, crossing another high ridge that called for not looking over the side while we walked. The scenery must have been beautiful, but with our eyes mostly on our feet, we missed a great deal of it. At one point we were met by a groom and horse, sent to us by Dr. Friedericks. We took turns with this sure-footed animal, and in time hired the services of two more we came across in a mountain village preparing to make the crossing with sacks of rice. As the day wore on, again and again we paused for breath and water. We used a Swiss filter pump to make the water drinkable and chlorine pills to kill the bacteria.

We finally entered a great plain planted with rice. Here and there a farmer urged on his water buffalo, pausing only momentarily to stare at the strange procession that passed him. At last, there loomed before us, still some miles ahead, the city of Tansen, hugging the mountainside in the distance. At first we dispaired, then took courage and moved on—not with "renewed vigor," however, for we had little vigor left. We camped at the base of the final hill and rested for an hour. And then we turned to face the last hurdle, an incline that appeared to rise straight up at a 90 degree angle.

It was our great good fortune that, when we had barely begun to climb this hill, Dr. Friedericks, astride a grey horse, appeared with a shout and a hello. A true gentleman, he dismounted—after our greetings were over—and insisted on one of us taking over his animal as he himself walked alongside. It did not take much persuading.

The above saga is recounted here simply to demonstrate the remoteness of the place that Dr. Friedericks has chosen to practice medicine. Now as to the man himself. . . .

Carl Friedericks calls Reading, Pa., home. He is 36 years old, and graduated the University of Pennsylvania Medical School in 1945, under the wartime accelerated program. He interned at the Robert Packer Hospital at Sayre, Pa. After a short jaunt with the Army ("I'm afraid my Army service was plush. I only fought the battles of New Jersey, Texas, and California"), he went to China on October, 1947, to Canton and Yeoung Kong, as a medical missionary. By June 24, 1950, he was out again.

"The Communists had come in the previous October—nine months before," he said. "It was just obvious that I was a handicap to the people. In addition to the personal danger that seemed to threaten, I was lonesome for my family that I had sent out earlier—to Korea to be safe! And being American, I was a source of embarrassment to my friends and hospital staff—it was becoming difficult for them to deal with me."

And so Dr. Friedericks moved from China to India, where he remained a year and a half. During this time, he took his first trip to Nepal with Dr. Robert Fleming, an ornithologist who had been there previously on a bird-collecting expedition for the Chicago Natural History Museum. It was while he was on this trip that he saw the tremendous needs of the people medically. Several influential citizens requested him to start a hospital there. Application was made to the government, and when he returned to the States again

in April, 1952, the matter was jointly considered and approved by the Presbyterian and Methodist missions. He came back to stay in June, two years later, under the auspices of the newly formed United Mission to Nepal.

"I had some small equipment I brought up with me," he recollected for us. "I ordered some other supplies and some medications, and while that was in the process of coming (it takes things three months to get here) I had a little bit of stuff—plus a microscope or two—to get started with."

"What did you do to start?"

"I collected some boys, the equivalent of our high school students, and a compounder, who corresponds somewhat to our pharmacist at home, and began training them in the basic sciences and in rudimentary nursing procedures, including training in laboratory techniques and public health. Later on my first missionary nurse came and took over the training in nursing. We opened for business the first of September, 1954."

Hospital and home for Dr. Friedericks was a rented building—"the biggest building in town with water on tap"—with which he was making do until a new hospital he was building of adobe brick was completed. His practice?

"Routine clinical practice plus some surgery. I've taught my compounder how to give anesthesia."

The people had practically no experience with modern medical practice until the doctor arrived—especially surgery. From Gorakhpur in northern India, 80 miles away, to Tibet and beyond (who knows?) there was no modern hospital service available to them before.

His patients represent a cross section of the community: Magars, village folk; Newars, early town settlers; Gurungs; Gurkhas, the warrior class; Brahmins, the highest caste; and occasional Tibetans. They are extremely conservative, and the later arrival of an English lady physician, Marjorie Foyle, helped considerably in treating the female patients. (When we were there, Dr. Foyle was in India on leave.)

We asked the doctor what diseases seemed most common in his area.

"Our major problem, as in most of Asia, consists of infectious diseases of all kinds. We have widespread cases of amebic dysentery. Tuberculosis is another serious problem—all kinds of tuberculosis. We get malaria cases from the valley below, but rarely from our immediate region. We also see cases of roundworms and hookworms and other intestinal parasites . . . a lot of general infection of wounds, that become infected due to neglect . . . and the usual injuries—people kicked by horses, or falling from trees, etc."

"Surgery?"

"Bladder stones are very common. Intestinal obstructions, sometimes. Quite a bit of bone surgery. And skin graft work, too . . . since they commonly build fires on the floor and let the children play close by unattended. But I've had only one appendix case since I've been here!"

He took us down and showed us the hospital itself. It was a 10-bed hospital occupying the first-floor area just below the doctor's living quarters. Its appointments were very primitive. It was strictly a case of make-do, the best one can until the new hospital is ready. Empty oil tins served as bedstands. Rough wooden frames, webbed, formed the beds. Lights were kerosene lamps, when they needed to be pressed into service, for every drop of oil was precious, having to be carried by foot over the same mountains and plains we had traveled. He was proudest of his x-ray machine, and the gasoline-operated generator he turned on when he wanted to use it. We saw the following patients: A very badly burned man who had run into a blazing house to save his goods, a severe case of hookworm and tuberculosis of the bone, combined, a case of severe dysentery, a boy of about 10 who had broken his arm in a fall, and a case of Kala-azar "black fever"—a parasite disease, carried by the sandfly, in which the spleen and liver are affected and become enlarged.

Later I accompanied the doctor on a house visit, which he makes rarely for lack of time. We found a member of the family waiting for us outside the door. We saluted him by placing the palms of our hands together and raising them to our face, and entered, mounting a flight of stairs.

"This family is comparatively well-to-do," explained the doctor as we went up. We took off our shoes at the open entrance of the room and went in. The patient, an elderly woman, was lying on a mat on the floor. There was no furniture about. The doctor squatted down, and after hearing from patient and family, examined the mother.

"There's an obstruction of the urethra," he said. "I'll have to have her over to the hospital to do any good."

He made this clear to the patient and the assembly, and as we prepared to leave they brought in a younger woman who had had a tooth removed. The doctor soon learned that she had apparently been given penicillin to which she had had a reaction. The doctor advised her to stop taking the penicillin and we took our leave.

As we turned down the cobbled street toward home, the doctor said:

"They know about penicillin and streptomycin. They've found out about them somehow. We do get a few wandering drug sellers up this way. But what they don't know is how to use them properly. They don't know that improperly prescribed, they can often be harmful instead of helpful."

We spent about four days in Tansen, seeing not a single wheeled vehicle of any kind the whole time we were there. We filmed the doctor as he treated his hospital patients, left the hospital to visit a nearby public school for his annual examination of the children, and, finally, with the arrival of long-awaited supplies, followed him out to a native village in the cholera area to inject the population for protection.

"If I can prevent one year's outbreak of cholera in one village," he said, "then I've really accomplished something."

Thus, for the "March of Medicine's" hour-long television report on American doctors the world over, we will bring back the story of perhaps the most remote of our American doctors—a man whose trail can be followed through the birthplaces of his family. He himself was born in Germany, his wife in Korea.

"Richard was born in Reading, Pa., Charles in India, and James, our youngest, in Nepal. James, as far as we know, is the first American to be born in Nepal."

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

Incidence of Chronic Pulmonary Disease Among Patients with Esophageal Disorders. J. R. Vivas and E. D. Palmer. Dis. Chest 31:568-574 (May) 1957 [Chicago].

Chronic pulmonary disease is a threat in patients who have an esophageal lesion that causes esophageal retention or transcardial reflux. The conditions arousing most interest in this respect are achalasia, diverticulosis, chalasia, hiatus hernia, esophageal foreign body, and stricture. Pulmonary involvement seems to result from periodic unrecognized aspiration of material from the esophagus. Presumably, this is largely a nocturnal affair, or at least recumbency favors migration of esophageal contents. The severity of pulmonary disease encountered in some instances of achalasia and of esophageal diverticulosis has been disturbing, and more information is needed on the incidence of both clinical and subclinical pulmonary disease in all esophageal abnormalities, both those of a retentive nature and those causing dyskinetic effects. The records of inpatients discharged from the Walter Reed Army Hospital during the calendar year of 1954 with diagnoses which included an esophageal disease were reviewed, but those with esophageal varices only were not included. There were 68 in this series. In order to include patients whose illness was not serious enough to require hospitalization, 32 additional outpatient records were selected at random to bring the total number to 100.

The group included 65 males and 35 females, ranging in age from 12 months to 89 years. Chronic pulmonary disease was found in 22 patients, that is, in 2 of 42 patients with hiatus hernia without secondary esophageal change; in 4 of 13 with diverticulum of the esophagus; in 2 of 12 with subacute erosive esophagitis without hiatus hernia; in 6 of 8 with achalasia; in 3 of 7 with subacute erosive esophagitis with hiatus hernia; in 2 of 3 with carcinoma of the esophagus; in 1 of 3 with Zenker's diverticulum; and, whereas both of the patients with esophageal stricture due to swallowing lye had chronic pulmonary disease, none of the 10 patients with other forms of esophageal strictures showed pulmonary involvement. These 10 included 6 with stricture secondary to esophagitis, 3 with congenital stricture, and 1 with radiation stricture. This study was undertaken not to prove cause and effect relationship but to bring out the high incidence of transadital aspiration type of pneumonitis in esophageal disease.

Experience with Anticoagulant Treatment. V. Debenedetti and M. Ravera. Minerva med. 48:1160-1165 (April 7) 1957 (In Italian) [Turin, Italy].

The authors report on the results of anticoagulant therapy in 390 patients treated for a total of 11,469 days. Eighty-seven patients had myocardial infarction; 131, phlebitis and thrombosis; 27, cerebral thrombosis; 41, pulmonary embolism; 19, coronary insufficiency; 48, cardiopathies with decompensation; and 37, arteritis. The treatment was always started with heparin and continued with Dicumarol. The best results were obtained in patients with phlebitis and phlebothrombosis, pulmonary embolism, myocardial infarction, and in many patients with heart failure. The authors used Quick's test for the control of the prothrombin level. Severe hemorrhage can be avoided if the test is used regularly and on fresh samples of blood. Severe hemorrhage occurred in 3 patients but was checked by suspension of the administration of the anticoagulant and with intravenous injections of vitamin K_1. Thirty-six minor hemorrhages were checked by diminishing the dose of the anticoagulant. There is no risk in a well-controlled treatment. Anticoagulant therapy is indicated for the prevention and treatment of postoperative complications which are mainly of a thromboembolic nature.

Preliminary Report on Long Term Treatment of Cardiosclerosis with Dicumarol. K. K. Bengtsen and G. Aspenström. Acta med. scandinav. 157:217-222 (No. 3) 1957 (In English) [Stockholm].

Dicumarol was given to 82 selected patients with myocardial infarction and to those with angina pectoris for an average time of 14.5 months. Severe cases and poor-risk patients were relatively numerous. No thromboembolic complications occurred in the 62 patients who are still receiving treatment. The death rate due to cardiac disease was 9.8% within the first year and 7% during the second and third years of treatment with Dicumarol, whereas the death rate of untreated patients with myocardial infarct or angina pectoris appeared to be 15 to 18% within the first year after diagnosis and about 9% during the following 2 years. Treatment was discontinued in 12 patients. One died from cerebral embolism and 4 had various thrombotic complications. It is suggested that these complications were due to the sudden withdrawal of the drug. Of 72 patients with angina pectoris 46 felt improvement, but this cannot with any certainty be ascribed to the anticoagulant. Hemorrhagic complications were rare and easy to control. For long-term therapy smaller doses of Dicumarol might be effective. Differentiation between good-risk and poor-risk patients should be made. The patients classified "stress

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The place of publication of the periodicals appears in brackets preceding each abstract.

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hyperreactors" with regard to the coagulability of their blood will benefit the most from treatment with Dicumarol. Prolonged anticoagulant therapy does not yet incontestedly appear to be superior to other therapy for some types of cardiovascular disease.

The Arterial Hypertension of Chronic Mercury Poisoning. F. Gobbato, G. Scansetti and F. Capellaro. Minerva med. 48:1209-1216 (April 11) 1957 (In Italian) [Turin, Italy].

The relation between prolonged occupational exposure to mercury and various cardiovascular-renal findings was investigated in 28 workmen. Their ages ranged from 26 to 67 years, and the periods of exposure from 6 to 45 years; all manifested some degree of chronic mercurialism and were receiving compensation for disabilities ranging from 21 to 100% of their normal working capacity. Within this limited group the systolic blood pressure was found to increase much faster (2.42 mm. Hg per year) after age 40 than it does in the general population (0.433 mm. Hg per year). The same was true for the diastolic pressure. Statistically significant positive correlations were found (*a*) between systolic blood pressure and duration of exposure to mercury and (*b*) between diastolic pressure and severity of symptoms of intoxication. Data on the velocity of the pulse wave in the aorta, on cardiac output, on renal blood flow, and on urea clearance were obtained in 12 subjects, and electrocardiograms from 15 have been analyzed in detail. From these and other data it is concluded that alterations of renal function directly attributable to chronic mercurialism are infrequent and that when renal alterations do occur they are probably the usual local effects of a general arteriosclerosis. The hypertension can be explained as originating in the central nervous system. The organic lesions known to occur in the nervous system can involve the central mechanism that regulates blood pressure, and they suffice to explain the neurological, emotional, and vascular phenomena of chronic mercurialism.

Effects of Aldosterone on Water, Electrolyte, and Nitrogen Metabolism in Addison's Disease. R. M. Salassa, H. L. Mason, V. R. Mattox and others. Proc. Staff Meet. Mayo Clin. 32:201-212 (May 1) 1957 [Rochester, Minn.].

Aldosterone has been isolated, structurally identified, and synthesized in the last several years. This potent sodium-retaining steroid has been found in adrenal and systemic venous blood and in the urine. Studies not only indicate that aldosterone is more potent than desoxycorticosterone acetate in causing sodium retention and potassium excretion but also suggest that there are other significant differences. Whereas earlier work with aldosterone suggested that the administration of this steroid would not result in edema and excessive retention of sodium, later reports indicated that in doses of about 1 mg. per day for 6 days aldosterone would cause retention of salt and water with mild edema and increase of intracellular fluid. The authors gave aldosterone to 3 patients who had adrenocortical hypofunction and observed the effects of moderate and relatively large doses of the steroid on electrolyte and nitrogen balance, total body water, exchangeable sodium, and blood electrolytes. They found that aldosterone is capable of correcting the electrolyte and water imbalances associated with Addisonian crisis and of maintaining electrolyte balance in patients who have adrenocortical hypofunction. The daily intramuscular administration of 400 or 800 mcg. of aldosterone for 7 to 14 days resulted in increased exchangeable sodium, increase of total body water, increase of extracellular fluid space, and development of mild edema. No hypertension, alkalosis, or change in pigmentation was observed during the administration of aldosterone, and there was no significant change in nitrogen balance. These studies indicate, as do previous observations by others, that large quantities of aldosterone are needed before one can produce and study the full picture of hyperaldosteronism in man.

Thalassemia Minor: Experience with 50 Consecutive Patients. M. B. Burris and R. Barzilai. J. Florida M. A. 43:1204-1206 (June) 1957 [Jacksonville].

The authors report on 50 patients with thalassemia minor referred to the section on hematology at the Ochsner Clinic in New Orleans. Nine of the patients were of Anglo-Saxon, 3 of French, 30 of Italian, 4 of Spanish, and 4 of Greek descent. Most of the patients were from the southern states. Only 10 had a hemoglobin level of less than 9.5 Gm. per 100 cc. In most of the patients the hemoglobin level ranged from 10 to 13.5 Gm. per 100 cc. The red blood cell count ranged from 3,200,000 to 7,000,000 per cubic millimeter. Reticulocytes were elevated above 2% in 19 patients, the highest count being 7%. The bilirubin level was elevated in only 2 of the 10 patients in whom it was determined. The degree of anisocytosis, poikilocytosis, and microcytosis was variable and did not correlate well with the level of hemoglobin. Patients with symptoms attributed to anemia frequently had these symptoms first on reaching some period of emotional stress well after maturity. In many the symptoms first appeared after anemia had been recognized and the patient had undergone a prolonged period of futile treatment. Thirty-four patients had been treated for periods up to 10 years with iron, vitamins, cobalt, and liver with or without other indications. Although such treatment is not physically harmful, with the possible exception of excessive iron or cobalt, those who were treated most energetically had the most severe functional complaints. There were no positive physical findings other than a variable degree of pallor and a palpable spleen in 13 of the 50 patients.

Thalassemia minor is frequently overlooked as a cause of microcytic anemia. Characteristically the mean corpuscular volume is low, the mean corpuscular hemoglobin decreased, and the mean corpuscular hemoglobin concentration normal or slightly below. There is increased resistance to hypotonic sodium chloride solution. Reticulocytes are normal or moderately increased. Indirect bilirubin is normal or moderately increased. The bone marrow shows an

increase in normoblasts. The serum iron level is elevated, and the iron-binding protein is saturated. Of great diagnostic significance are similar hematological findings in one of the parents. The disease is not infrequent among the Mediterranean races, is seen occasionally in patients of other racial extraction, and is not rare in the southern part of the United States. The diagnosis is not difficult to make once the condition is considered. Before their admission to the hematological department, anemia had been previously recognized in 39 of the 50 patients, although the diagnosis of thalassemia minor had been considered in only 4. Ordinarily the anemia causes no symptoms or only mild complaints. Unrelated functional complaints are common.

Treatment of Lupus Erythematosus with Antimalarial Drugs. M. H. Foss. Tidsskr. norske lægefor. 77:341-344 (April 15) 1957 (In Norwegian) [Oslo].

During the last several years, Resochin therapy has been the standard method of treatment applied in the Rikshospital in the chronic discoid form of lupus erythematosus. The substance was usually given in doses of 0.25 Gm. twice daily for a week, then 0.25 Gm. daily. The treatment lasted for from 1 week to 22 months, average time, 16 weeks. Follow-up of 57 patients (19 men, 38 women), aged between 30 and 60, with chronic discoid lupus erythematosus treated in the dermatologic department of the hospital in 1955 showed a complete regression in 20 cases, in 14 of which subsequent relapse occurred; improvement in 24; no response in 12; and aggravation in 1 case. Side-effects were seen in 21 cases. The treatment had to be discontinued in 9 cases but could be resumed in 4. Great caution is called for in the use of Resochin in treatment of systemic lupus erythematosus; if it is applied in such cases, combined treatment with cortisone is advised.

Technic of Controlled Drug Assay Illustrated by a Comparative Study of Rauwolfia Serpentina, Phenobarbital and Placebo in the Hypertensive Patient. A. P. Shapiro and H. C. Teng. New England J. Med. 256:970-975 (May 23) 1957 [Boston].

A technique for controlled drug assay applied to a comparison of Rauwolfia serpentina and phenobarbital in a group of 144 ambulatory patients with mild to moderately severe hypertension is described. The patients were divided at random into 3 groups of 48 each and given alseroxylon (Rauwiloid), phenobarbital, and placebo respectively. Most of the patients were told that a new medicament was being given them, but they were not informed of its nature. The physicians in the clinic had no knowledge of which preparation a given patient was taking. The patients were not assigned to any one physician in the clinic, to ensure randomization study of the effect of the doctor-patient relation. Psychotherapeutic measures were avoided as much as possible. Sixteen patients did not return to the clinic after the initial visit. The average duration of treatment was approximately 30 weeks, identical for each group. In 1 patient receiving Rauwiloid a subarachnoid hemorrhage developed, and he died. Improvement in over-all function was noted in about a third of the patients receiving placebo and Rauwiloid and in more than a half in the group given phenobarbital. However, there was no difference in effects on headache and cardiovascular symptoms. Side-effects were found in 30% of the patients given placebo, in 62% of those given Rauwiloid, and in 43% of those receiving phenobarbital. Rauwolfia alkaloids produce a slight but definite decrease in peripheral resistance. The tendency to weight gain, evoked by the Rauwolfia alkaloids, and their production of various troublesome side-effects may outweigh the hypothetical benefits derived from their quite modest effect on peripheral resistance. Phenobarbital sedation is capable of decreasing blood pressure to a lesser degree but with less intense side-effects, no weight gain, and a more intense feeling of well-being in the hypertensive patient. The experimental design employed in this study is recommended for use in similar drug assays.

Spontaneously Regressive Enlarged Mediastinal Lymph Nodes in the Adult: On the Basis of 12 Cases. J. Leménager, J. Porin and J. Rousselot. Semaine hôp. Paris 33:1526-1535 (April 20) 1957 (In French) [Paris].

The increasing use of routine radiologic examinations has led, in recent years, to the discovery in many persons, usually anergic to tuberculin, of enlarged mediastinal lymph nodes that cause no symptoms and that regress spontaneously after periods varying from a few weeks to a few months. The benign nature of the enlargement cannot be immediately affirmed, because Brill-Symmers disease in its initial phase may be characterized by a mediastinal lymph-node tumor that later becomes secondarily malignant. The follow-up in an appreciable number of cases, however, has been long enough to justify the recognition of a group of benign conditions of the mediastinal lymph nodes that progress spontaneously and definitively to cure. The origin of these conditions has not yet been determined, but 3 principal causes have been suggested: bacterial or viral infection, tuberculosis, and Besnier-Boeck-Schaumann sarcoidosis.

Tests designed to reveal the presence of infection usually produce negative results, although it has been possible in a few instances to identify a specific virus. Thus ornithosis was discovered in one patient, another had infectious mononucleosis, and in others cat-scratch fever and benign postvaccinal lymphoreticulosis were demonstrably present. The infrequency, however, with which proof of viral infection can be obtained in patients with apparently benign mediastinal lymph-node enlargement has led investigators to turn their attention chiefly to tuberculosis and Besnier-Boeck-Schaumann sarcoidosis as possible causes of the enlargement. The tuberculin anergy usually found in the patients is not incompatible with the presence of tuberculosis, because tuberculin-induced reactions are sometimes very slight and inconstant even in patients with genuine tuberculosis. The discovery of lymph-node or pulmonary tuberculosis does not exclude the possibility of sarcoidosis, since the two conditions may coexist. Several workers have suggested that the enlarged

lymph nodes are in reality purely mediastinal forms of Besnier-Boeck-Schaumann sarcoidosis and that the polyvisceral character of the disease will become evident later on in other parts of the body. The possibility that sarcoidosis may be present in these patients should be kept in mind, but, because of the frequency with which spontaneous regression of the enlarged lymph nodes takes place and because of the apparently benign nature of the condition, even when the enlargement shown by the x-ray examination is striking, a diagnosis of sarcoidosis or tuberculosis should not be made without adequate histological or bacteriological proof. Similarly, the mere fact that the mediastinal lymph nodes are enlarged should not be regarded as justifying immediate x-ray treatment.

Diagnostic Difficulties During the Simultaneous Occurrence of Tuberculosis and Bronchogenic Carcinoma. T. A. J. Kroon, J. G. Roosenburg and H. Deenstra. Nederl. tijdschr. geneesk. **101**:822-824 (May 4) 1957 (In Dutch) [Haarlem, Netherlands].

The histories of 5 patients are presented that demonstrate the difficulty of detecting a bronchogenic carcinoma in a patient with pulmonary tuberculosis. The authors emphasize that the possibility of the simultaneous existence of a pulmonary carcinoma should be considered in all patients with pulmonary tuberculosis who are over 40. An unusual course of tuberculosis, an enlarging focus, the development of an obstructing infiltration, or the fact that there are not many tubercle bacilli demonstrable in the presence of a cavity should raise the suspicion of the presence of a pulmonary carcinoma.

The Vascular Complications of Diabetes Mellitus: A Clinical Study. J. W. Bryfogle and R. F. Bradley. Diabetes **6**:159-167 (March-April) 1957 [New York].

Vascular disease has increased in importance in patients with diabetes mellitus since the introduction of insulin has reduced the incidence of coma and infection as causes of death and thereby increased the life expectancy. The authors investigated 394 diabetic patients, selected regardless of age or duration of diabetes for the presence of 4 vascular complications: diabetic retinopathy, diabetic nephropathy, peripheral vascular disease, and arteriosclerotic heart disease. At least one of these vascular lesions was found in 49.5% (195 patients). In almost one-half of these, more than one type of vascular complication existed. After 20 or more years of diabetes, 87.5% of these patients had one or more vascular complications. Retinopathy was most frequently seen, being present in over 50% of those with diabetes for 10 to 15 years and in more than 84% of those with diabetes for 20 years or longer. Diabetic nephropathy was present in approximately 10% of all patients and in 24% of those with diabetes for 15 years or more. Peripheral vascular disease was noted in 13.7% of these diabetics. Arteriosclerotic heart disease was present in 18.5% of the entire series and in 26.5% of those beyond age 39. Angina pectoris and myocardial infarction were present in 12.3 and 11.3%, respectively, of patients over the age of 39. When more liberal criteria were used, the likely incidence of arteriosclerotic heart disease was 56.2% at age 40 or more and for those aged at least 50, 66.4%. The most characteristic diabetic vascular lesions, retinopathy and nephropathy, were related chiefly to the duration of diabetes. Arteriosclerotic heart disease and peripheral vascular disease, which are less specific for diabetes, were related in their incidence both to the age of the patient and to duration of diabetes.

Epidemic Rheumatic Fever: Problems in Control at a Recruit Training Base. B. M. Reen, N. Schalet and H. B. Houser. U. S. Armed Forces M. J. **8**:802-810 (June) 1957 [Washington, D. C.].

The exact nature of the relationship between group A streptococcic infections and rheumatic fever has not been established. It has been shown that first attacks of rheumatic fever can be prevented by adequate treatment of streptococcic infections with penicillin or broad-spectrum antibiotics. In the general population this is difficult, and, while it has been suggested that the "captive population" of a military base would be an ideal group in which to treat acute streptococcic infections for prevention of rheumatic fever, this article outlines some of the difficulties in such a program and the specific measures employed to reduce the incidence of rheumatic fever. A throat culture was obtained from all patients with respiratory disease admitted to the base hospital at Sampson Air Force Base in New York state. Strains of beta-hemolytic streptococci isolated from these cultures were identified by Lancefield group and type. The hospital charts of all patients with a discharge diagnosis of acute rheumatic fever were reviewed. The hospital admission rate of patients exhibiting 10 or more colonies of group A streptococci on admission throat culture is shown in a graph. The predominant type of group A Streptococcus throughout the study period was 19. The admission rate of streptococcic pharyngitis rose rapidly during the late fall months to a peak of 12.5 cases per week per 1,000 men; dropped in late December, coincident to the Christmas and New Year's leave period; and then rose rapidly to a peak of 11.3 by Jan. 26. At this point, penicillin prophylaxis was administered on a base-wide scale, and the rate dropped off precipitously. The rate began to rise again in the early weeks of March and reached a peak of 12.7 by early April. This rate was sustained until mid-June and thereafter fell off to negligible levels for the summer.

The rate of rheumatic fever rose with the increased hospital admissions for streptococcic disease and fell off at the time of penicillin prophylaxis. Two weeks after the streptococcic infection rate again began to rise, the incidence of rheumatic fever began to increase. Although the streptococcic hospitalization rate again reached proportions similar to those earlier in the season, the concomitant rise in rheumatic fever was less than earlier. Several possible explanations for the failure of the rheumatic fever rate to parallel the streptococcic infection rate in the second half of the reporting period are discussed. Host susceptibility seems likely. Some families have a higher rheumatic

fever incidence, and the tendency of rheumatic fever subjects to have recurrences is recognized. The seasonal variation in the incidence of rheumatic fever merely reflects the seasonal incidence of streptococcic infections. The presence of a particularly virulent rheumatogenic strain of Streptococcus in the early part of the winter seems unlikely in view of the fact that there was no type change in the streptococci responsible for disease during the 2 periods.

A graph indicates that during the weeks prior to penicillin prophylaxis many cases of streptococcic infections were either not recognized or inadequately treated. Little more than 25% of the estimated cases of streptococcic disease reached the hospital, whereas after the period of penicillin prophylaxis over 50% of the estimated patients were hospitalized and adequately treated. It is difficult to make the trainee return for further penicillin therapy after his symptoms have subsided, and it is advisable to treat persons with streptococcic pharyngitis in the hospital. By hospitalization of patients with respiratory disease, many cases of streptococcic infection that would otherwise have gone unrecognized were discovered and treated.

Rheumatic Manifestations in Hodgkin's Disease, Leukemia and Allied Conditions. E. Paguet and J.-M. Delage. Canad. M. A. J. **76**:927-933 (June 1) 1957 [Toronto, Canada].

The authors report the occurrence of rheumatic pain in 24 of 108 patients with Hodgkin's disease, in 6 of 43 patients with acute leukemia, in 2 of 13 patients with lymphosarcoma, in 1 of 36 with chronic lymphocytic leukemia, in 4 of 19 with granulocytic (myelocytic) leukemia, and in 6 of 15 with plasma cell (multiple) myeloma. The spine was most commonly involved in patients with Hodgkin's disease, the lumbar or thoracolumbar segments were the most commonly affected and next, in order of frequentcy, the sciatic area or legs and the hip joints. Symptoms referable to the bone and joints were more frequently seen in children with acute leukemia than in the other types of leukemia. Diagnostic difficulty may exist with rheumatic fever. The pain occurred usually at the onset of the disease in patients with acute leukemia and multiple myeloma but more often in the course of the disease in patients with Hodgkin's disease. No constant relationship existed between painful manifestations and x-ray patterns. Although infrequent in chronic leukemia, rheumatic pain was more often observed in granulocytic than in lymphocytic types.

Blood Ammonia Levels in Hepatic Cirrhosis: Their Control by the Oral Administration of Neomycin. C. J. Fisher and W. W. Faloon. New England J. Med. **256**: 1030-1035 (May 30) 1957 [Boston].

The relation between elevated blood ammonia concentrations and the development of hepatic coma has called attention to the production of ammonia by bacterial enzymatic action upon urea and other nitrogenous compounds in the gastrointestinal tract. This has led several authors to suggest that antibacterial agents effective against intestinal organisms might be beneficial in this type of coma. This communication reports the effect of oral administration of neomycin upon blood "ammonia" concentrations and upon mental status in patients with cirrhosis. To elucidate the mechanism of the effects observed, observations upon fecal bacterial flora and upon ammonia concentration in arterial, peripheral venous, abdominal collateral, and portal vein blood also were carried out.

It was found that administration of neomycin orally in doses of 8 to 12 Gm. daily reduced venous blood ammonia to normal levels in 12 studies in 11 patients, 2 of whom were examined in 4 episodes of stupor or impending hepatic coma. Clinical improvement was observed in the patients with neurological or mental symptoms. After withdrawal of neomycin in 8 patients without neurological changes, the blood ammonia level rose promptly to control levels in 7 and showed a delayed rise in the 8th patient. Stool cultures obtained during neomycin administration either were sterile or revealed urease-negative organisms regardless of the dose received. Neomycin was found in the blood in insignificant concentrations except in the presence of renal disease with nitrogen retention. It is concluded that neomycin reduces the blood ammonia level in patients with cirrhosis, with or without neurological changes, by virtue of its effect upon the bacterial flora of the intestine. Neomycin is an effective therapeutic agent in patients with hepatic cirrhosis and ammonia intoxication.

Hepatic Coma: A Clinical Study. M. Delp, W. G. Calkins and R. W. Weber. Arizona Med. **14**:335-342 (June) 1957 [Phoenix].

The authors report on 43 patients, 21 male and 22 female, between the ages of 8 and 75 years, with liver disease manifesting coma. Irritability, confusion, lethargy, flapping tremor, and fetor hepaticus formed the most helpful symptoms and signs in predicting that coma was imminent. Biochemical liver-function tests were not helpful in predicting the onset of coma. Although it is commonly stated that patients in hepatic coma have hypoglycemia, this was not observed in any of the 43 patients. A factor precipitating hepatic coma was strongly indicated in 39 patients. Of these, 21 had evidence of gastrointestinal bleeding with blood in the intestinal tract before the onset of coma. Three patients had received ammonium chloride before the appearance of coma. One patient had received amino acid preparations intravenously. One had received exchange resins containing ammonium. Thus 26 patients had unusual amounts of nitrogenous substances in the intestinal tract before coma developed. Pneumonia occurred before the onset of hepatic coma in 3 patients. Precoma and coma rapidly followed paracentesis in 3 patients. Coma occurred after surgical intervention in 2 patients. Coma followed the administration of barbiturates in 2, of narcotics in 1, and of acetazolamide in another. An alcoholic debauch immediately preceded hepatic coma in only 1 patient.

Although the exact mechanism is not clear, more and more evidence is accumulating to indicate that increased blood ammonia levels are important in the

causation of hepatic coma. Blood ammonia concentrations were determined in 100 normal blood donors. Values between 50 and 110 mcg. per 100 cc. were considered normal. Values between 111 and 135 mcg. per 100 cc. were considered to be borderline, and values over 135 mcg. per 100 cc. were considered definitely abnormal. Blood ammonia levels were determined in 14 patients with liver disease, 8 with hepatic coma and 6 without. Of the 8 patients, 3 had normal blood ammonia levels and 5 had abnormally high blood ammonia levels on at least one occasion. All 6 patients without coma had normal ammonia levels.

A Study of the Relation of the ABO Blood Groups to Peptic Ulceration and Hypertension. S. Pell, C. A. D'Alonzo and A. J. Fleming. Ann. Int. Med. **46**:1024-1030 (June) 1957 [Lancaster, Pa.].

Reports in the literature on significant relationship between ABO blood groups and certain diseases induced the authors to study the distribution of blood groups in 12,904 employees of the DuPont Company whose blood types were available. Among the various diseases prevalent in this population, peptic ulcer and hypertension were the only 2 the incidence of which was high enough for adequate statistical analysis. The study of the distribution of blood groups in 298 persons with a history of peptic ulcer showed an increased frequency of O blood and a reduced frequency of A blood of about 5% when compared with a control group of employees without history or evidence of peptic ulcer. This relationship is consistent with, but not so great as, that observed by other investigators. The findings concerning the distribution of blood groups in 508 persons with hypertension were inconclusive but did suggest that there may be a slightly greater chance of the possible occurrence of hypertension in persons with type A blood than in those with type O blood. Additional data are needed to clarify the nature and extent of this relationship. Consideration might be given to these findings in a preventive medical program.

SURGERY

Intracardiac Surgery in Deep Induced Hypothermia. H. B. Wulff, K. Hæger, H. Ryd and others. Acta chir. scandinav. **112**:186-198 (No. 3-4) 1957 (In English) [Stockholm].

Nine children, 5 girls and 4 boys, between the ages of 2½ and 14 years and 1 22-year-old woman with congenital heart disease were operated on while under hypothermia. Eight patients had atrial septal defects, 1 had tetralogy of Fallot, and 1 had transposition of the aorta and valvular pulmonary stenosis. The patient was given premedication on the day of the operation with 1 mg. of chlorpromazine, 0.5 mg. of meperidine (Demerol) hydrochloride, and 0.01 mg. of atropine per kilogram of body weight. Anesthesia was induced with vinyl ether–ether, after which an endotracheal tube was introduced. A heart catheter was passed by way of the saphenous vein until its tip lay roughly at the level of the diaphragm. Through this catheter the patient received 1 mg. of procaine amide per cubic centimeter of dextran solution by drip. The drop rate was adjusted so that from 500 to 1,000 cc. of the solution was infused during the cooling procedure. In addition, the patient was given 100 mg. of procaine amide at the beginning of the operation and another 100 mg. shortly before the circulation was shut off. Highly cold-sensitive parts of the body, such as the hands, feet, ears, and external genitals, were wrapped in cotton wool, and a few drops of liquid paraffine were inserted into the eyes, after which the nude patient was enclosed in a thermobox in which hypothermia was induced by circulating cold air. The cooling procedure required between 1.3 and 2.5 hours according to the body surface and weight of the patient. At from 28 to 30 C (82.4 to 86 F) deep rectal temperature, the patient was removed from the box and the operation was started. The temperature decreased regularly 2 or 3 degrees after removal of the patient from the box. During the initial phase of the cooling procedure, the patient spontaneously breathed a mixture of oxygen, nitrous oxide, and ether in a semiclosed system with carbon dioxide absorption. At 33 C (91.4 F) respiration was taken over by the anesthetist, whether spontaneous respiration was satisfactory or not. Vigorous hyperventilation was started, with 30 to 40 respirations per minute. Any tendency to shivering was controlled by intravenous injection of minimal doses of succinyl choline (10 to 20 mg.) or chlorpromazine (10 to 25 mg.). The patient was rewarmed after the operation in the box with warm circulating air (45 C [113 F]). Rewarming usually required 2 to 4 hours.

Nine of 10 patients operated on while under hypothermia survived the hypothermia and the operation. One died in the course of the operation. Autopsy revealed not only a larger atrial defect than that for which he was operated on but also a ventricular septal defect. Surgery and not hypothermia must have been responsible for his death. Septicemia caused the death of a second patient on the 18th postoperative day. Autopsy revealed a trilocular heart with atrophy of the right ventricle but normal tricuspid valves emptying into the left ventricle. The septicemia was explained by suppurative endocarditis. Whether or not hypothermia as such contributed to the development of septicemia is difficult to say. Cardiac standstill occurred in 1 patient when the thorax was opened. The complication was immediately detected, thanks to cardioscopic control, and successful cardiac massage was started within 1 minute. It is probable that the cardiac standstill was at least partly precipitated by the injection of 100 mg. of procaine amide into the inferior vena cava. Since then this drug was injected over a longer period and the commercial solution was diluted 1:10 with isotonic sodium chloride solution. Six of the patients operated on had a slight rise of temperature postoperatively for periods up to 3 weeks. The immediate risks of surgical treatment during hypothermia may be somewhat greater than during normothermia, but the bloodless heart permits much more radical intervention and better late results.

Effect of Bilateral Adrenalectomy on Diabetes Mellitus. H. J. Wolff, B. J. Kennedy and M. B. Johnson. Minnesota Med. 40:318-321 (May) 1957 [St. Paul].

The authors comment on the relentlessly progressive vascular disease seen in some patients with diabetes mellitus, pointing out that juvenile diabetic patients are especially prone to have premature arteriolar degeneration, with vascular lesions making their first appearance from 5 to 15 years after the onset of clinical diabetes. Microaneurysms in the retinal arterioles are often recognized in the early stages of vascular degeneration, and the kidney frequently follows as a major area of impact. Kimmelstiel and Wilson observed in diabetic persons intercapillary glomerulosclerosis characterized in the advanced stages by hypertension, retinitis, nitrogen retention, proteinuria, and hypercholesterolemia, with eventual renal failure and death. Hypoglycemic and hyperglycemic stress factors and resultant adrenal cortical dysfunction are readily recognized in the clinical course of most patients with diabetes in whom early vascular degeneration is prone to develop, and this suggested that total bilateral adrenalectomy might modify the arteriolar degenerative lesions of diabetic patients.

The authors review the literature on adrenalectomy in diabetes mellitus and report the history of another young diabetic patient with associated vascular disease who underwent total bilateral adrenalectomy. At least 12 diabetic patients have been reported on in whom bilateral adrenalectomy was carried out because of advanced vascular disease. Five of these 12 died postoperatively due to either adrenal insufficiency (3) or continued progression of the degenerative vascular lesions (2). It appears that at least one reason for the unfavorable outcome of adrenalectomy lies in the advanced degree of vascular deterioration that has always been present before operation was considered. Several authors advocated that patients with evidence of severe vascular and renal deterioration, significant nitrogen retention, proteinuria in excess of 5 Gm. daily, and diastolic blood pressures more than 120 mm. Hg. should be excluded as candidates for adrenalectomy. Total bilateral adrenalectomy as a therapeutic measure in the initial stages of arteriolar degeneration would appear to represent radical therapy, but it is evident that procrastination until the vascular or renal lesions have reached the stage of irreversibility has not been successful. As an ancillary procedure calculated to prolong life in a diabetic patient with advanced vascular disease, total adrenalectomy does not appear to deserve approbation.

Wedge Resection in the Treatment of Tuberculosis: A Study of 150 Operations. J. J. Quinlan, V. D. Schaffner and J. E. Hiltz. Canad. M. A. J. 75:842-844 (May 15) 1957 [Toronto, Canada].

It has been widely accepted for a number of years that closed caseous tuberculous lesions that remain after the completion of other types of therapy should be resected. At the Nova Scotia Sanatorium, a large proportion of such lesions were found to be located near the periphery of the lung and so could be removed by a simple wedge resection. The sanatorium records of 144 patients who underwent 150 consecutive wedge resections between September, 1951, and September, 1955, were reviewed. The closed caseous lesions remained after prolonged therapy with a combination of at least 2 tuberculostatic agents. The chest was entered through the 4th and 5th intercostal space by a posterolateral thoracotomy. There was 1 postoperative death, in a 52-year-old man, which seemed to have been caused by coronary occlusion. No complications resulted in 131 (87.3%) of the operations. So-called stubborn space, a pleural space that was still present 2 weeks after the operation, was the most frequent complication, occurring after 13 of the operations. All but one of these spaces eventually became obliterated. There were 3 empyemas, 2 tuberculous and 1 nontuberculous. All resolved with needle aspiration and antimicrobial therapy. In 3 instances, tuberculous disease may have spread. Bronchopleural fistula and wound infection occurred in 1 patient each. Bacteriologic examination of the resected specimens revealed tubercle bacilli in 58 on either slides or cultures. The authors conclude that the results of wedge resection are generally very satisfactory.

Clinical Studies in Extracorporeal Circulation with a Heart-Lung Machine. C. Crafoord, B. Norberg and A. Senning. Acta chir. scandinav. 112:220-245 (No. 3-4) 1957 (In English) [Stockholm].

Intracardiac operations were performed with the aid of extracorporeal circulation using a specially devised heart-lung machine in 5 children between the ages of 2 and 15 years and in 8 adults between the ages of 17 and 52 years with congenital and acquired heart disease. The heart-lung machine consisted of an oxygenator and a pumping device combined with a regulating unit. The artificial oxygenation took place by means of rotating screen cylinders, and the effect could be raised with a preoxygenator of the bubble type. Venous return to the machine was accomplished by gravity, and no attempt was made to restrict the flow. The artificial heart consisted of an automatically regulated pump. The heart-lung machine was filled with freshly-drawn heparinized blood from donors. Of the 13 patients, 1 had an aneurysm of the left ventricle; 2 had ventricular septal defects; 3, atrial septal defects; 1, combined atrial and ventricular septal defects; 2, congenital aortic stenosis; 1, complete transposition of the great vessels; 1, isolated infundibular pulmonary stenosis; 1, mitral stenosis, aortic stenosis and tricuspid insufficiency; and 1 ventricular septal defect and valvular pulmonary stenosis.

Five of the 13 patients died; in 1 of the 5, death was caused by an error in the procedure, since the flow rate of perfusion was too low during a considerable part of the intracardiac operation. One 2-year-old girl died within 24 hours after the operation, and no satisfactory explanation of the cause of death was found. The death of the patient with transposition of the great vessels resulted, after complete correction of the anomalies, from heart failure. One patient with congenital aortic stenosis and calcifications of the valve died on the 4th postoperative day of pulmonary com-

plications, and 1 patient with multivalvular disease and cirrhosis of the liver died on the 4th postoperative day of hepatic insufficiency. The remaining 8 patients were alive at the time the paper was written.

Biochemical studies revealed metabolic acidosis as the most conspicuous change in the patients operated on with the aid of a heart-lung machine. This change may also be found in patients subjected to heart operations without by-pass procedures, although it is then less pronounced. The acidosis was regarded as detrimental, and its correction by means of bicarbonate infusion was recommended. A moderate reduction in serum potassium and calcium levels was found to occur, but these levels were restored to normal spontaneously. Other ionic changes were less constant and were considered to be unimportant. Serum enzyme changes followed a pattern typical of myocardial infarction, and they may have been the result of the surgical trauma. Bromsulphalein clearance tests provided valuable information concerning liver function; they showed that the liver was subjected to a particular stress which might have been due partly to acidosis. The morphologic blood elements showed moderate changes in the course of the operation, but marked leukocytosis was present during the first postoperative week. The blood platelet count dropped to a minimum within about 5 days after the operation but was restored to normal within 10 to 14 days.

Chronic Leukemic Lymphadenosis and Pulmonary Resection: The Question of Operability of Leukemic Patients. H. Effenberger and J. Schulte. Thoraxchirurgie 4:547-551 (April) 1957 (In German) [Stuttgart, Germany].

A case of lymphocytic leukemia was diagnosed in a 41-year-old man who had an open progressive pulmonary tuberculosis with large cavities. During hospital treatment with a combination of chemotherapeutic and antibiotic drugs a regression of the tuberculosis with shrinkage of the cavities occurred. Several weeks later, however, an exacerbation of the lymphocytic leukemia occurred with noticeable deterioration in the blood status. After the chemotherapy was interrupted, the lymphocytic values became readjusted but the pulmonary tuberculosis again showed progression. Resumption of the chemothra,py did not arrest the progression of the tuberculous process. Since the lymphadenosis seemed to have a protracted chronic course and since damage of the erythropoietic system and, with this, reduction of hemoglobin formation could be excluded, it was decided to arrest the pulmonary tuberculosis by resection of the left upper lobe. The intervention was tolerated without complications. During the postoperative period an average of 300 cc. of bank blood was administered once a week. These transfusions resulted in a reduction of the leukocyte values. Four weeks after the resection the blood status had been restored to preoperative values. The patient has been working for about a year as a clerk. At a follow-up examination 14 months after the operation both the chronic lymphocytic leukemia and the pulmonary tuberculosis seemed to be under control.

Carcinoid Tumors: Report of Case with Ileal Involvement. C. W. Mayo and W. M. Hardy. Proc. Staff Meet. Mayo Clin. 32:254-257 (May 15) 1957 [Rochester, Minn.].

The authors report the case of a 59-year-old man in whom exploratory laparotomy disclosed 20 carcinoid tumors involving a 2-foot segment of the ileum. Metastasis was present in the liver. His chief complaints had been intermittent episodes of crampy abdominal pain, distention, and borborygmi. Occasional intestinal bleeding, attributed to hemorrhoids, had been present for a number of years. This case was somewhat unusual in that the patient had none of the symptoms, such as flushing, asthma, cardiac murmurs, cyanosis, edema, and diarrhea, usually attributed to the presence of serotonin.

Management of Imperforate Anus. L. Shaffner. North Carolina M. J. 18:202-207 (May) [Winston-Salem].

The management of the imperforate anus presents a twofold problem: there is the immediate need to relieve intestinal obstruction, and a choice has to be made of a procedure that will ultimately allow the patient to have normal intestinal function and control. This second consideration is often overlooked in the urgency to establish some type of opening. Judging from referrals, there apparently still is a great temptation to do a minor "stab" incision in the perineum or a colostomy. The inadequacy of either procedure becomes apparent after 2 or 3 weeks in one or two ways. Either the "stab" wound will begin to form a stricture, causing another partial obstruction, or, in cases of rectourinary fistulas, chronic urinary infection develops even in the presence of a colostomy. After these complications have developed, surgical attempts at secondary repair are much more difficult. Initial repair of imperforate anus should not only relieve the obstruction but promise normal intestinal control and function. Accurate diagnosis as to the type of anomaly, with or without a perineal, urethral, vesicle, or vaginal fistula, is essential to adequate treatment. Other serious anomalies involving the heart, esophagus, and urinary tract are common and should be sought for.

The membranous type of imperforate anus can be easily treated by simple anoplasty. In the imperforate type, with the rectal pouch 1.5 cm. or less from the anal skin, a perineal approach is usually possible and should be attempted. With a higher pouch, especially in the male with a rectourethral fistula, an abdominoperineal pull-through procedure is indicated. Two of the 9 deaths that occurred in the 41 patients whose cases are reviewed by the authors were attributed to operation for imperforate anus. Follow-up ranging from 1½ to 13 years in primary perineal procedures showed good to excellent results in 10 cases; in 3, wound breakdown or stricture was noted when the patient was last seen. Of 7 patients undergoing abdominoperineal repair, 3 have had good function after 2 to 4½ years, 2 infants were recently operated on, and 2 have strictures requiring further surgery. All patients required postoperative dilatations, and about half needed an additional minor anoplasty. Colostomy

should be used only as a temporary measure to help handle complications. The earlier definitive repair is done, the better is the chance for normal control and function.

The Fate of Esophageal Varices in Cirrhosis Following Surgical Portal Decompression. E. D. Palmer. Gastroenterology. 32:861-867 (May) 1957 [Baltimore].

Success of surgical portal decompression in the treatment of esophageal varices secondary to cirrhosis must be measured largely in terms of prophylaxis against future hemorrhage. This report deals with the fate of varices in patients with cirrhosis, as judged by esophagoscopic measurement, following portacaval shunt, splenorenal shunt, or without a surgical shunt. Sixty-three patients with cirrhosis proved by liver biopsy were followed by periodic esophagoscopic examinations for up to 63 months following surgical portal decompression for esophageal varices. An end-to-side portacaval shunt had been made in 49 patients, and an end-to-side splenorenal shunt in 14 patients. The control group consisted of 45 patients for whom shunt was recommended but who refused the operation. Portacaval shunt proved far more effective in reducing portal pressure and eliminating varices than did splenorenal shunt. The latter operation gave good immediate results, but as time went on the varices tended to become worse and the portal pressure rose progressively. With portacaval shunt, on the other hand, the immediate results were excellent and later any remaining varices tended to disappear or to become very much smaller. The varices of the cirrhotic patient may disappear spontaneously without the operation, but there will probably be a return in all cases as time goes on. Esophageal varices secondary to cirrhosis are vacillating structures influenced by a head of portal pressure which is constantly changing. Variations in portal pressure continue after surgical portal decompression, but at much reduced levels.

Bacteriological Experiments with Surgical Plastic Dressings. G. R. Wallgren. Acta chir. scandinav. 112: 161-169 (No. 3-4) 1957 (In English) [Stockholm].

Five plastic solutions recommended for use as surgical dressings were tested in vitro and in vivo. These are (1) Bonoplast, an acrylic resin dissolved in ethyl acetate with the addition of a plasticizer; (2) Aeroplast, an ethyl acetate solution of copolymers of hydroxyvinyl chloride acetate and sebacic acid 9.3% by weight and modified maleic resin ester 3.1% by weight, with fluorochloro-hydrocarbon gas as a propellant; (3) Newskin, consisting of pyroxylin 6.9%, camphor 0.6%, castor oil 3%, butyl alcohol 5%, ethyl acetate 57.3%, and ethyl alcohol 25%; (4) Nobecutan, consisting of a 4% by weight solution of polymetacrylic acid ester with an ether bridge in the alcohol component; and (5) Portex plastic skin, consisting of phenyl salicylate 10%, resorcinol 5%, egenol 25%, and a proprietary Portex double methyl ester of acrylic resin. The results of more than 2,000 bacteriological tests made on culture plates, principally on blood agar, and on patients' intact skin, showed that (1) the plastic solutions listed were sterile in themselves; (2) on the addition of certain bacteria the plastic solutions again became sterile after a certain maximum interval; (3) a zone of inhibition at the edge of or above the plastic film was produced only by Nobecutan; (4) the microorganisms tested penetrated the plastic films, but macroscopic growth was not always visible under the films and through-growth did not occur when the films were made a little thicker than normal; and (5) a slight reduction appeared in the bacterial flora underneath the plastic films.

The plastic films are superior to cotton-wool dressings in many regards. If all the qualities of the tested plastics are taken into account, Nobecutan and Aeroplast are better than the other products. A plastic film is suitable as a mechanical protection for preoperative covering of the skin and as wound dressing for clean wounds in otherwise healthy skin. The scope of the antiseptic effect of a plastic film in which disinfectants have been incorporated is not yet sufficiently guaranteed for plastic film alone to replace all surgical cleansing of the skin, but an effect like that exerted by Nobecutan is not without significance. A film thickness of from 60 to 90 μ is recommended for Nobecutan, but to achieve this film thickness 4 to 5 coatings by spray were always required.

Cholesterosis of the Gall Bladder. W. F. Mitty Jr. and L. M. Rousselot. Gastroenterology 32:910-916 (May) 1957 [Baltimore].

Cholesterosis of the gallbladder has been known as a pathological entity since 1857, but a clear understanding of its pathological process is largely due to Boyd's studies, reported in 1923. In cholesterosis the lipoid is usually most abundant in the epithelium covering the villi of the mucosa. Cholesterosis of the gallbladder should be reemphasized, because it is often neglected in the differential diagnosis of biliary tract disease. The true incidence of the condition is difficult to ascertain, as it varies between autopsy material and surgical specimens. In order to determine if a gallbladder obtained at autopsy is involved with cholesterosis, the examination must be accomplished within 3 hours of death, before autolysis of the mucosa takes place. Gallstones and cholesterosis often concur, and it has been stated that cholesterosis without calculi is of no clinical significance and that cholesterosis per se does not produce symptoms. It is this contention the current study purports to refute.

The authors found that the diagnosis of cholesterosis was verified in 70 of 1,054 patients by pathological examination of the removed gallbladder. In 38 of these 70 patients no stones were associated with the cholesterosis. Abdominal pain was noted in 34 of 38 patients; 20 of these patients located it in the right upper quadrant; 4 had colicky pain localized to the periumbilical region; and 10 complained of epigastric pain. In 19 patients the pain was referred to either the shoulder or the back. The mechanism of pain in this disease, so similar to true biliary colic, is not clearly understood. Cholecystography was performed in 28 of the patients. It revealed normal function in 14 and

impaired function in 9. In 5 the gallbladder was not visualized, but in 2 of these 5 calculi were found. There was little correlation between the abnormal cholecystograms and the histological examinations of the gallbladder. Of the 14 patients who had either impaired function or nonfunction of the gallbladder, only 4 had microscopic evidence of an associated chronic cholecystitis.

The patients presenting normal cholecystograms but classic symptoms of gallbladder disease represent a challenge to the internist and the surgeon. It is in this group of patients that duodenal drainage is indicated, and cholesterol crystals, if found, will indicate the diagnosis of cholesterosis. It is only under these circumstances that a cholecystectomy is justified. Without a positive duodenal drainage study and in the presence of a normal cholecystogram and normal operative findings no indication for cholecystectomy exists. The authors were able to follow 32 of the 38 patients and found that 28 of the 32 were free from symptoms. The other 4 still had symptoms, but in these the predominating complaint preoperatively was not pain but heartburn, gaseous eructation, and flatulence. The treatment of choice is cholecystectomy. Cholesterosis is probably a local manifestation of a systemic disease involving a disturbance of cholesterol metabolism. Its focal occurrence in the gallbladder often presents a clinical pattern similar to chronic cholecystitis with or with cholelithiasis.

Blood Vessel Replacement Therapy. F. N. Cooke. J. Florida M. A. **43**:1109-1116 (May) 1957 [Jacksonville].

Of 46 operations in which blood vessel transplants were used to reconstruct arterial continuity, 3 were performed as emergency procedures for an aneurysm that had ruptured, 16 grafts were placed in the abdominal aorta as an elective procedure, 6 were placed in the thoracic aorta, and 21 were placed in peripheral vessels. Nine of the 46 patients died, an operative mortality of 19.1%. The results in the patients who survived the operation for aneurysm were gratifying. Peripheral circulation was adequately reestablished in all. Only 2 of these patients died in the late postoperative period; 1 of them died of malignant disease of the prostate and the other of a ruptured abdominal aneurysm after a successful transplant for a thoracic aneurysm. Autopsy was performed in both and revealed that the homologous graft was functioning well at the time of death. Of the 21 peripheral transplants 14 were used for traumatic arteriovenous fistula and aneurysm. In 9 of the 14 patients, autogenous vein grafts and in 5, homologous arterial grafts were used. These transplants have functioned in a highly satisfactory manner for many years. Ten of the 46 operations were performed for obliterative arterial disease, and the results were not as good as in the case of those performed for aneurysm. The disease is diffuse, and there may be occlusion distal to the by-passed segment. Most of the failures were attributed to the skip areas of obliteration, i. e., to the nature of the arteriosclerotic disease itself.

For short defects in peripheral vessels such as have been observed in traumatic aneurysm or arteriovenous fistula, the autogenous vein graft offers an excellent method of reestablishing vascular continuity. The homologous arterial graft which has been sterilized and stored in a frozen state has given highly satisfactory results in the surgical treatment of aneurysm. When normal or near normal proximal and distal arterial segments are present, restoration of vascular continuity can be accomplished with certainty. In obliterative arterial disease it is the disease itself which in most patients determines the success or failure of the replacement therapy.

Cancer-Cell Seeding of Operative Wounds as a Cause of Failure in the Surgical Treatment of Cancer. R. R. Smith and A. W. Hilberg. J. Maine M. A. **48**:151-156 (May) 1957 [Brunswick].

Cancer cells have been demonstrated on instruments, in wash water, and on the surface of organs. A study was undertaken at the Clinical Center, National Institutes of Health, to determine how frequently tumor cells could be identified in washings taken from operative wounds. Patients with cancer that by accepted standards was considered operable but by reported end-results would have a high incidence of local recurrence were treated by the usual en bloc cancer surgery. Just before closure of the skin flaps, after the surgical removal of the primary tumor and its lymph node drainage area, the wound was thoroughly washed with sterile isotonic sodium chloride solution in a fine spray. The washings were collected in a glass container and mixed as soon as possible with the fixative of 70% or 95% alcohol.

The washings were then centrifuged at 2,500 rpm. Part of the resulting sediment was covered with 10% formalin and the button of fixed sediment embedded in paraffin and sectioned in the routine manner for tissue sections. Another part of the sediment was smeared directly on clean glass slides, which were then immersed in a solution of equal parts of 95% alcohol and ethyl ether. After 30 minutes, and while wet, the slides were stained by routine nuclear and cytoplasmic stains. The Papanicolaou staining technique was the standard method used. The slides were screened by technicians trained to interpret exfoliative cytologic material, and cells or groups of cells to be studied by the pathologist were marked.

In the first 113 patients studied, cancer cells were demonstrated in 31 (positive results), and in an additional 16 patients the cytologist could not be definitely sure as to the nature of the cells and reported the washings as suspicious. In the remaining 66 patients, no tumor cells were found. The significance of these results is difficult to determine at this time. Many of the patients have not had sufficient time to manifest their metastases. Since the wounds were thoroughly washed, it will be difficult to determine just what the washing alone will do to the incidence of local recurrences. There are 7 known seeded recurrences in the operative area in patients with positive washings and an additional 2 recurrences in patients with suspicious

washings. There have been recurrences in 7 patients whose washings were free from tumor cells. It is believed that in some patients local seeding is the cause of failure of surgical treatment. If effective chemotherapeutic agents are discovered which can selectively destroy cancer cells that either become embedded in the wound or break off and are free in the blood or lymph channels, effective cancer therapy will be available.

PEDIATRICS

Visceral Larva Migrans: A Cause of Severe Eosinophilia. F. C. Vanore. M. Ann. District of Columbia 26:245-247 (May) 1957 [Washington, D. C.].

Visceral larva migrans results from the ingestion of dirt infested with eggs of Toxocara canis, a parasitic round worm whose natural host is the dog. T. canis is especially seen in areas where the soil is sandy, warm, and moist. It is one of the commonest parasites found in the soil. About 90% of dogs under 2 years harbor the round worm. The fertile eggs are passed in the dog's stools and contaminate the soil; after 3 weeks the eggs become embryonated and may be swallowed by man, especially children, who do not observe sanitary precautions. The larvae hatch, penetrate the intestinal wall, and migrate to various organs. The larvae usually remain in the liver, where they become encapsulated and perish after several months. T. canis, unlike Ascaris lumbricoides, never reaches a mature form in man, since the natural host is the dog, and therefore stools of a suspected patient will be negative for ova and parasites. Visceral larva migrans is related to cutaneous larva migrans or creeping eruption in that both are caused in the infective stage by larvae of nematode parasites specific for lower animals.

The clinical symptoms of children who have this disease are protean and may be mistaken for Löffler's syndrome and tropical eosinophilia. Fever, leukocytosis, hyperglobulinemia, and pulmonary changes are common. The pulmonary changes are suggestive of patchy pneumonitis and Löffler's syndrome. Clinically the findings are akin to bronchitis and bronchopneumonia. The patient may exhibit malaise, pallor, anorexia, muscle aches and pains, nausea and vomiting, and jaundice. Hepatosplenomegaly is common. An impetiginous, pruritic type of skin rash may appear on the trunk and extremities. White blood cell counts may range from 15,000 to 80,000 per cubic millimeter of blood, with an eosinophilic percentage between 20 and 80. The disease is highly probable in an infant or child, usually between the ages of 1½ to 3 years, who has a history of ingestion of dirt with a persistently high eosinophil count. A definitive diagnosis can only be made by liver biopsy and identification of the larvae on serial sections. Although usually benign and self-limiting, the disease may cause severe symptoms. Treatment of the disease in man has been unsuccessful to date, but cortisone may be used empirically.

Calcification of Intervertebral Discs in Children: Report of a Case. M. B. Mann. North Carolina M. J. 18:195-197 (May) [Winston-Salem].

While calcifications of intervertebral disks are usually degenerative processes in adults and of negligible clinical significance, there have been few reports of radiologically demonstrable disk calcifications in children. The case of the 9-year-old Negro boy reported in this paper was the 21st reported in the English language literature. The boy was hospitalized with a history of pain and stiffness in the neck and shoulder, which gradually subsided in the course of several weeks, but, because of these symptoms and abnormal findings in roentgenograms of the cervical portion of the spine, he was referred to the hospital. The right shoulder was held higher than the left, with the head tilted slightly to the right. There was fairly good range of motion of the neck, but extension produced sudden pain over the anterior portion of the right shoulder. Lumbar lordosis was prominent. Submandibular nodes were slightly enlarged. The lungs were clear. A systolic murmur was heard over the precordium. Slight weakness of the deltoid and right biceps and triceps was demonstrated. Physiotherapists observed weakness of the right shoulder and arm, especially in the deltoid and latissimus dorsi muscles. A roentgenogram of the chest and fluoroscopic examination of the heart showed no abnormalities, but roentgenograms of the cervical and lumbar spine showed calcification between the 4th and 5th cervical vertebrae and the 5th lumbar and 1st sacral vertebrae. An orthopedic consultant concurred with the diagnosis of calcified intervertebral disk syndrome of childhood. Follow-up examination 6 months later revealed that the calcification had disappeared from the cervical region but was still present in the lumbosacral region.

In 16 of the 21 children with intervertebral disk calcifications local symptoms occurred at the site of the calcification. The other 5 cases were diagnosed on the basis of incidental findings noticed during the examination of patients with seemingly unrelated illnesses. The reversible calcification in children is quite different from the irreversible calcification of the spine in adults. It is possible that the variations in vascularization of the disks in childhood and in adult life may account for these differences. Up to the age of 10 or even 20 years there is a profuse blood supply to the intervertebral disk through vascular channels which are embedded in and perforate the cartilaginous plates. These vessels originate in the spongiosa of the vertebral bodies and are later obliterated by fibrous changes. Two factors, either singly or together, could account for the transient calcification phenomena. Trauma to the highly vascularized disk in childhood may result in hemorrhage and hematoma formation and subsequent calcification. The rich blood supply would probably explain the eventual clearing of the calcification. In addition, calcification may be the result of infectious processes involving the disks. Signs of infection such as fever, leukocytosis, pain, and increased sedimentation rate were noted in some of the patients.

Congenital Aortic Stenosis in Children. B. Landtman and E. I. Wallgren. Ann. Paediat. Fenniae. **2**:259-269 (No. 4) 1956 (In English) [Helsinki].

Congenital aortic valvular defects are comparatively rare. A total of 6,400 children was examined at the cardiac clinic of the Children's Hospital, University of Helsinki. The clinical diagnosis of congenital aortic stenosis was established in 24 children between the ages of 3 months and 16 years. Two of the patients were siblings. The children were not cyanotic. The aortic stenosis was present as an isolated lesion in 17. One had aortic incompetence, 4 had a patent ductus arteriosus, 2 had coarctation of the aorta, and 1 presented clinical signs suggestive of a ventricular septal defect. A rough systolic murmur, usually accompanied by a thrill, maximal over the aortic area, transmitted to the vessels of the neck, was the outstanding feature of aortic stenosis. Phonocardiograms showed a diamond-shaped systolic murmur, transmitted by the blood stream as well as along the walls of the blood vessels. Most of the children showed radiological evidence of left ventricular enlargement, which was more conspicuous in the children with complicated lesions. The electrocardiograms revealed different degrees of left ventricular hypertrophy or strain. All but one of the children with isolated aortic stenosis were asymptomatic. The patients with patent ductus arteriosus improved after ligation of the ductus. None of the patients died during the follow-up period, which varied from 1 month to 3 years. No attempt was made to differentiate clinically between valvular and aortic stenosis, although angiography was sometimes of help in separating the 2 types.

A Fatal Granulomatosis of Childhood: The Clinical Study of a New Syndrome. H. Berendes, R. A. Bridges and R. A. Good. Minnesota Med. **40**:309-312 (May) 1957 [St. Paul].

The authors report observations and studies on 4 male children who were observed at the University of Minnesota Hospitals since 1950 and who had a hitherto unreported syndrome consisting of chronic suppurative lymphadenitis, hepatosplenomegaly, pulmonary infiltrations, and eczematoid dermatitis about the eyes, nose, and mouth. During the first year of illness the chronic lymphadenitis was the most prominent clinical manifestation. This process seems gradually to abate while the pulmonary disease and general debilitation dominate the clinical picture during the later stages of the disease. Death occurred in 3 patients after an illness of from 2 to 3½ years. One child has had his disease for a little over 1 year. All patients were boys. One child had a suggestive family history. In 3 previous generations on the maternal side of this boy's family, with the exception of the boy's grandfather and great-grandfather, all the males died during infancy with a syndrome described as either boils and septicemia or scrofula. The maternal grandfather, who survived, still has a mass in the cervical area. Numerous laboratory studies were made on the 4 children, and autopsies and pathological studies were made on the 3 who died.

The authors believe that the symptoms are the result of a generalized granulomatous process. They were associated with a striking hypergammaglobulinemia. The authors differentiated this new syndrome from recognized forms of infectious and noninfectious diseases producing granulomatous processes in childhood, but they feel that there is a remote possibility that this malignant granulomatous disease is actually a childhood expression of sarcoidosis. The treatment of these children was largely empirical. Chloromycetin and erythromycin were used in high doses for periods of at least 1 month. Combinations of penicillin and sulfadiazine and the various tetracyclines were used for periods of one to several months. Novobiocin was also tried without effect, and aminosalicylic acid, streptomycin, and isoniazid were used without effect in 2 of the patients. Relentless progression seems to be the most characteristic feature of the syndrome.

DERMATOLOGY

Fatal Agammaglobulinemic Progressive Vaccinia. H. M. Lewis and F. C. Johnson. A. M. A. Arch. Dermat. **75**:837-844 (June) 1957 [Chicago].

The recovery of an individual infected with vaccinia virus reflects his ability to produce adequate, appropriate, antivaccinal antibodies. Failure to produce such bodies may be due to agammaglobulinemia or dysgammaglobulinemia. Dysgammaglobulinemia differs from agammaglobulinemia in that it is amenable to therapy (hyperimmune vaccinia gamma globulin), runs a prolonged course, and represents a qualitative rather than a quantitative defect in gamma globulin formation. In the absence of gamma globulin, virus-neutralizing antibody is not formed. Inability to produce adequate virus-neutralizing antibody results in the initial site of vaccination undergoing enlargement and necrosis. Many new concomitant lesions resulting from hematogenous virus dissemination undergo a similar metamorphosis, showing no sign of healing, with ultimate destruction of the host by the virus. This entity, known as agammaglobulinemic progressive vaccinia, is usually fatal within 2 months or less.

Dermatitis Medicamentosa Due to Antipyrine. C. B. Kennedy, F. H. Davis, V. M. Henington and M. J. Sternberg. A. M. A. Arch. Dermat. **75**:826-836 (June) 1957 [Chicago].

During the period beginning July 1, 1949, and ending May 1, 1956, 132 patients were admitted to the dermatologic wards of Charity Hospital of Louisiana in New Orleans with a diagnosis of dermatitis medicamentosa. Included in this group were 27 Negro patients in whom the eruptions and other symptoms were clearly attributable to a preparation for the treatment of colds, manufactured under the name 666 (containing 0.6 Gm. of antipyrine). The lesions noted were large, widespread, and numerous, involved considerable mucous membranes, and were of the fixed eruptive type. Druggists have reported an increase in the sale of this preparation, and this increase is in direct proportion to the increasing number of reactions

observed. The group of 27 patients observed contained 21 males ranging from 21 to 64 years of age. Seventeen of these patients had taken 666 in the past, but only 9 reported a previous reaction. Without exception, where there had been more than one reaction, succeeding reactions were even more severe and of a more frequent nature.

Members of a white group reported that they used the preparation only for a specific medical reason, while members of the Negro group were more inclined to use it for a hangover, "a good cleaning out," and purgative action. The dose in Negro patients was consistently larger than indicated in the directions and was taken quite frequently, in contrast to that in white patients, who generally followed directions. The increased sensitivity to reaction among Negroes may be described as cumulative, with patients continuing to use the preparation in spite of both past and current reactions.

The Diagnosis of Lupus Erythematosus. A. H. Slepyan, D. V. Frost, L. R. Overby and others. A. M. A. Arch. Dermat. 75:845-849 (June) 1957 [Chicago].

Lupus erythematosus, because of its protean manifestations, has often posed a difficult diagnostic problem in spite of many well-established criteria. The ratio of bound to free pantothenic acid levels of whole blood in patients with discoid and systemic lupus erythematosus is constantly lower than those found in normal controls. Patients with lymphocytic infiltration of the skin exhibited a normal to high bound-to-free pantothenic acid ratio. Patients with lymphoblastoma showed an abnormally low bound-to-free ratio, which suggests that the same inherent enzymatic defect was peculiar to both lymphoblastoma and discoid and systemic lupus erythematosus. Similar findings regarding systemic and discoid lupus erythematosus suggest that they are one and the same, as the same enzymatic defect is manifest in both stages of disorder.

Cutaneous Candidiasis: A Clinical and Therapeutic Study. S. A. Simuangco, M. C. Fernandez, P. O. Campos and others. J. Philippine M. A. 33:257-270 (April) 1957 [Manila].

A group of 147 patients who were suspected of having fungus diseases of the skin were studied with the aim of determining the incidence of candidiasis (moniliasis) in relation to other mycotic infections. For Candida alone, 50.3% of the patients were found to be positive, indicating that this was probably the primary cause, whereas 6.8% were positive for Candida and other fungi, indicating that the candidiasis was superimposed. The over-all incidence of candidiasis was 57.1%. It appeared that candidiasis is more common in fungous diseases than it was thought to be, according to other reports. One hundred thirty-one patients with cutaneous candidiasis were given nystatin tablets in doses ranging from 250,000 to 500,000 units 3 to 4 times daily; ointment and powder were applied once or twice a day. The majority of the patients responded to the drug within the first week. The lesions of the 6 cured patients (4.58%) disappeared within 14 to 56 days. Follow-up culture for Candida albicans gave negative results in 2 of these patients. Remarkable improvement was observed in 80 of the 131 patients (61.06%), 12 had slight response (9.16%), and 24 had no response at all (18.39%). The presence of secondary changes, such as eczematization and secondary infection, should be cleared up before treatment with nystatin is started. Certain predisposing factors such as diabetes, obesity, malnutrition, or occupation need a previous correction. An additional treatment with hydrocortisone might produce better results in the complete cure of cutaneous candidiasis.

UROLOGY

Bladder Neck Obstruction and Associated Lesions in Children. E. Burns, E. H. Ray Jr. and J. W. Morgan. J. Urol. 77:733-740 (May) 1957 [Baltimore].

Obstructive lesions of the lower urinary tract in children are now recognized as common. Changes in the bladder and upper urinary tract are in proportion to the degree of obstruction and the length of time it has existed. Since these lesions are congenital, the duration of the obstruction is determined by the age of the child. Associated lesions are frequently encountered. In the 129 children with congenital bladder neck obstruction treated surgically by the authors at the Ochsner Clinic and Charity Hospital in New Orleans, the types of lesions and their distribution were as follows: congenital prostatic valves in 3, congenital hypertrophy of the verumontanum in 2, and congenital hypertrophy of the internal sphincteric area in 123. The remaining patient had a greatly dilated urinary tract when examined at the age of 6 weeks. An obstructive lesion was questionable in this child, and failure of normal development appeared more likely. The signs and symptoms produced by bladder neck obstruction in children show wide individual variation. Perhaps the most common finding that leads to investigation of the urinary tract is pus in the urine. Infected urine was found in 79% of the 129 children, and 89% of these had suffered recurrent attacks of chills and fever. Infection in these patients is a complication of obstruction, frequently a late one, and the fact that urinary infection led to the initial urologic investigation indicates that earlier symptoms were overlooked or considered insignificant. Importance should therefore be attached to any variation from the normal voiding pattern in a child. Other symptoms were frequency and straining to urinate, urgency, enuresis, overflow incontinence, acute retention, and hematuria. The incidence of acute retention in children is low. Acute retention occurred in only 5 of the 129 children. Gross hematuria occurred in only 6 of this group. It usually occurs while the patient is straining to urinate and is more likely to happen in those with an acute infection.

Changes in the urinary tract produced by bladder neck obstruction in children vary somewhat from those observed in adults. The period during which hypertrophy of the bladder musculature may compensate for the increased difficulty in performing its function appears to be short in children, giving way to such rapidly progressive dilatation that the bladder

becomes a large atonic sac. Vesicoureteral reflux is also encountered more frequently in children. In those patients with reflux varying degrees of hydronephrotic atrophy of the renal cortex will be found. Vesical diverticula of clinical significance occur less frequently in children. They were found in only 2 of the 129 children. The diagnosis of obstruction of the lower urinary tract in children requires, in addition to routine chemical and bacteriological studies of the urine and renal function tests, specific urologic studies. These include excretory urography, retrograde cystography, cystoureteroscopic examination, and retrograde pyeloureterography. Treatment of bladder neck obstruction in children is surgical removal of the primary obstructive lesion by transurethral resection or through the suprapubic transvesical approach.

Local Injections of Hydrocortisone for the Effective Treatment of Circumscribed Strictures of the Urethra. M. K. Lyons and C. D. Bonner. J. Urol. 77:741-755 (May) 1957 [Baltimore].

The authors report experiences with this type of treatment in 53 patients with 56 strictures of the urethra and the meatus. There were 18 strictures of the meatus, 15 of the anterior urethra, 18 of the membranoprostatic junction and 5 of the posterior urethra. An aqueous suspension of hydrocortisone was injected directly into the tunica propria at the base of the stricture at 2 clock positions, 5 and 7 or 3 and 9. No anesthesia was required in the meatal stricture, and the injection was done directly without the aid of urethroscopy, a 2-cc. syringe and a 22-gauge needle being used. Strictures of the anterior and posterior urethra were located and visualized through the McCarthy foroblique panendoscope, and injection was done with an especially devised endoscopic needle passed through the panendoscope and inserted into the tunica propria beneath the stricture under direct vision. The most important feature of this insertion is to get the needle well under the mucosa and into the tunica propria underlying the stricture before the hydrocortisone is injected. The injection was done under local intraurethral anesthesia with 1:500 nupercaine solution or, more desirable, under low spinal or general anesthesia as the case indicated. With each treatment the stricture was first dilated to its limit of distensibility without rupture.

Total dosages of 25 mg. to 150 mg. of hydrocortisone in from 1 to 8 injections were administered. When more than 1 injection was given, the successive ones were done in most instances at intervals of 2 days. Total dosage and interval of injections varied. Patients received prophylactic chemotherapy or antibiotic therapy; however, no complications resulted from the omission of this therapy in more recent cases. Fifty-one of the 56 urethral and meatal strictures were cured by the local injection of hydrocortisone into the tunica propria below 2 clock positions of the urethral stricture. Cure was usually obtained with 3 or fewer injections. Two dense elongated strictures and 3 multiple strictures not amenable to this therapy were eventually cured by internal urethrotomy and injection of the incision site with hydrocortisone.

OPHTHALMOLOGY

Treatment of Retinal Artery Occlusion. L. M. Weerekoon. Am. J. Ophth. 43:947-950 (June) 1957 [Chicago].

The pathology of retinal artery occlusion is still being debated. Three causes have been suggested: (1) embolism, (2) local vascular accident (thrombus), and (3) arterial spasm. Of these, the first has been rejected. Thrombosis is generally thought to be the cause of retinal occlusion today, but the author believes that arterial spasm is always present, either as the primary cause or secondary to a thrombus. Patients with retinal artery occlusion can be divided into 2 groups: (1) young adults who show no abnormality other than cold fingertips or other evidence of vasomotor instability, in whom arterial spasm is the primary cause of occlusion, and (2) persons who are past middle life and who have arteriosclerotic disease and/or hypertension and thus are predisposed to develop thrombi. The author feels that treatment of retinal occlusion should be based on the premise that every case involves a spasm. Retrobulbar injection of a vasodilator is the best of the medical methods of treatment, while stellate ganglion block, in an attempt to reduce sympathetic overactivity, is apparently an effective surgical measure. Seventeen patients were given retrobulbar injections of Priscol (imidazoline hydrochloride) or Ronicol (β-pyridyl-carbinol) followed by systemic treatment, and useful vision was restored in many of the patients. Priscol is contraindicated in patients with coronary disease and peptic ulcer because of its histamine-like action.

INDUSTRIAL MEDICINE

Organic Phosphate Insecticide Poisoning: An Agricultural Occupational Hazard. C. S. Petty. J. Louisiana M. Soc. 109:158-164 (May) 1957 [New Orleans].

Four cases of organic phosphate insecticide poisoning incurred during the crop-dusting season are reported in patients between the ages of 15 and 44 years. The first patient was employed as a "mixer" of insecticides and was wearing a raincoat, gloves, and a respirator when opening cans of 25% Parathion. Since he was adequately protected, it may be assumed that the mask leaked or the filter elements may have been exhausted by long use. In this patient, mild Parathion poisoning was manifested by profuse sweating, a marked tremor of the hands, a sluggish reaction of normal-sized pupils to light, and a blood cholinesterase level of about 50% of normal. The second patient was spraying methyl Parathion on crops with his aeroplane. A slight leak developed in the insecticide storage tank in the front cockpit of the aircraft, permitting the insecticide to leak onto the pilot's leg for several days. Weakness, abdominal cramping, nausea, vomiting, and diarrhea occurred. When he was admitted to hospital his pupils were narrow; he was profusely sweating and salivating and had a coarse tremor of the hands. The pilot of an airplane faces an additional hazard from organic phosphate poisoning in that the pupils may be narrowed and accommoda-

tion may be impaired, making judgment of depth and distance poor. The third patient applied tetraethylpyrophosphate with a small hand-sprayer to a small crop. No protective clothing was worn and no respirator was used. Weakness, muscular twitching, abdominal cramps, nausea, and vomiting occurred within 2 hours, and the blood cholinesterase level was 5% of normal. Tetraethylpyrophosphate is the most potent of the organic phosphate insecticides and should never be handled without adequate protective clothing and equipment. The 4th patient was employed as a "flagger" in the cotton fields. He was exposed for several days to a spray of 1% methyl Parathion released from an aeroplane. Dizziness and vomiting occurred. The next day cigarettes made him feel sick, and his blood cholinesterase level was about 40% of normal.

All 4 patients were treated successfully with atropine. The recommended initial dose of the drug is 2 to 4 mg. (1/30 to 1/15 grain) given intravenously or intra muscularly. If, 10 to 20 minutes after such a trial dose, drying of the skin and mucous membranes and dilatation of the pupils have not occurred, the patient may be given large amounts of the drug (up to 30 mg. in the first hour). In giving the atropine, the effects of the drug are "titrated" against the effects of the poison. Artificial respiration may be necessary for the comatose patient. The contaminated clothes of the victim must be removed and the surface of the body washed in an effort to prevent continuing absorption of the agent through the skin. Repeated atropinization may be necessary.

Absence of Raynaud's Phenomenon in Workers Using Vibratory Tools in a Warm Climate. T. A. Lloyd Davies, E. M. Glaser and C. P. Collins. Lancet 1:1014-1016 (May 18) 1957 [London].

The Raynaud phenomenon is induced by exposure to cold and precipitated by the use of vibratory tools. In cold weather people working with vibratory tools often display this phenomenon on their way to work, especially if they use a bicycle or a motor-cycle, but symptoms may disappear during work when the body warms up. Raynaud's phenomenon is unknown among men using vibratory tools in Singapore, and it was therefore of interest to find out whether it is either masked or prevented by a warm climate. Singapore is within 1½ degrees of the equator, and its climate is uniformly warm. Studies were made on 31 workers who had been using vibratory tools in a Singapore dockyard. Most of them had done this work for more than 3 years and 10 of them for more than 15 years. All tests were made in a cool room at 10.5 C (51 F) while the men wore tropical clothes but no shoes or socks. A period of not less than 75 minutes was allowed to enable the men to complete thermal adjustments. After the preliminary period each man immersed his right hand and wrist in water at 10 C (50 F) for 10 minutes.

None of the dockyard workers showed any signs of Raynaud's phenomenon. The evidence suggests that vibration induces the Raynaud phenomenon only if there is also intermittent cooling of the body and of the hands. The authors conclude that an investigation on the lines of the present experiment, involving thorough cooling of the whole body as well as immersion of the hand, would show up potential sufferers from the Raynaud phenomenon. If all those intending to use vibratory tools were tested in this way, it would be possible to classify Raynaud's phenomenon as an industrial disease. Thorough general warming of the body and hands before starting work in places heated to relatively high environmental temperatures might be advantageous.

PUBLIC HEALTH

Preventive Treatment of Tuberculosis in Italy: The Present-Day Approach to the Problem. S. Taronna. Clin. pediat. 39:31-39 (Jan.) 1957 (In Italian) [Bologna, Italy].

The author describes 3 periods of the campaign against tuberculosis that has been waged in Italy since 1927. The first period, from 1927 to 1940, was characterized by the obligatory establishment of centers for the fight against the disease. Problems such as early diagnosis and assistance for admission to health centers were solved considerably, and the mortality rate diminished markedly. The incidence of infection and the mortality rate increased markedly during the second period, which lasted from the beginning of the war to the immediate post-war years. Antibiotics reduced markedly the mortality rate during the third period, from the post-war years to the present day. A tendency toward chronic forms of the disease, the large number of infectious sources, and resistance to antibiotics are the major problems that the campaign for the prevention of tuberculosis faces in Italy today. Mass roentgenologic examination reduced the morbidity rate of the city of Venice from 5.23% in 1950 to 1.02% in 1955. Very good results have been obtained with vaccination. Only 0.36% of 3,952 children that were vaccinated contracted tuberculosis; 2,742 of these children lived in a contagious environment, and 0.51% of these contracted tuberculosis. The author thinks that the next step of the campaign is to improve the conditions of chronic patients, who increase continuously in number.

Grand Rapids Fluoridation Study—Results Pertaining to the Eleventh Year of Fluoridation. F. A. Arnold. Am. J. Pub. Health 47:539-545 (May) 1957 [Albany, N. Y.].

The results of 11 years of water fluoridation in Grand Rapids, Mich., for both deciduous and permanent teeth have been summarized. The results of this study, together with others which have been conducted for similar periods, indicate the feasibility of this procedure for the control of dental caries. In all studies the findings show a reduction of 60 to 65% in the prevalence of caries in the permanent teeth of children born subsequent to the change in water supply. Furthermore, the evidence strongly suggests beneficial effects on teeth which were formed, or erupted, prior to the initiation of water fluoridation.

BOOK REVIEWS

Principles of Surgical Physiology. By Harry A. Davis, M.D., C.M., F.A.C.S., Clinical Professor of Surgery and Director of Surgical Research, College of Medical Evangelists, Los Angeles. Foreword by Lester R. Dragstedt, Professor of Surgery and Chairman of Department, University of Chicago, Chicago. Cloth. $20. Pp. 841, with 49 illustrations. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16, 1957.

This book is a well-written condensation of currently available information. It is primarily a surgical textbook with emphasis on physiological aspects, for the author maintains a clinical approach throughout. The usual presentation of the basic physiology of each system is included, but, in addition, most of the disease processes of interest to the surgeon are discussed specifically and symptoms and signs are correlated with physiological changes. The book is divided into two sections. The first consists of 13 chapters dealing with such general subjects as nutrition, cellular metabolism, surgical convalescence, and tissue transplantation. The second section, also 13 chapters, is devoted to a more detailed presentation of each major system of the body—except the special senses. Throughout the book and in an appendix are tables of chemical and physiological tests currently in use, including pulmonary function tests, data on cardiac catheterization, and tests of endocrine function. In addition to normal values, changes resulting from specific lesions are recorded. This is an excellent textbook for the young surgeon. For the more advanced student, however, the coverage of many subjects is too brief, and discussion of controversial points is too limited or omitted. The value of this volume would be enhanced by increasing the scope of the bibliography. Nevertheless, this is one of the best works available on this subject.

Ciba Foundation Symposium on the Nature of Viruses. Editors for Ciba Foundation: G. E. W. Wolstenholme, O.B.E., M.A., M.B., and Elaine C. P. Millar, A.H.-W.C., A.R.I.C. Cloth. $8. Pp. 292, with 57 illustrations. Little, Brown & Company, 34 Beacon St., Boston 6; J. & A. Churchill, Ltd., 104 Gloucester Place, Portman Sq., London, W.1, England, 1957.

Since the Ciba Foundation was established in London in 1947 as an international educational and scientific center, it has arranged conferences and symposiums and arranged for publication of the proceedings. In this 32nd book of the series, 17 eminent scientists give their ideas on such topics as the structure of viruses revealed by the electron microscope, the chemistry of viral mutants, ribonucleic acid in influenza virus, multiplication of animal and plant viruses, morphologic aspects of viral infections of cells revealed by fluorescent antibodies, the size and distribution of specific antigens in virus-infected tissues and their significance, and the interaction of phages with bacterial cell walls. The papers and discussions show that a long road has been traveled from the point of departure—the mysterious filterable infective particle—to a typical virus particle envisioned as a structure made up of nucleic acid carrying genetic material and a coating of proteins with enzymes determining its antigenic specificity. It is now known that the protein and nucleic acid portion of certain plant viruses can be dissociated and later recombined to form a reconstituted infective particle, making it clear that viral multiplication is a special case of protein biosynthesis.

Aside from great intrinsic interest to biology, the implications of the phenomena analyzed and discussed extend far beyond the field of viral research and have many practical objectives. They make it apparent that the solution of the problems of controlling viral multiplication by chemotherapeutic agents can come only through biochemical study of viruses. Prevention of viral diseases requires either the preparation of purified vaccines or the selection of living vaccine strains appropriate to the purpose. Why it is so difficult to prepare a formalin-treated poliomyelitis vaccine of constant value is partly explained. From a human point of view, the important feature of any virus is its virulence. The approach to the resulting problems is mainly academic in that it stresses the morphologic, physical, and chemical methods of developing hypotheses. The biologist and the physician should take advantage of this opportunity to learn about the contributions being made by physicists and chemists to viral research. This book requires careful study. It is a rich source of critical information assembled in a well-printed, well-illustrated form. It brings together scattered observations and facts by reviewing for the scientist certain phases of viral research. Students of microbiology should broaden their horizons by reading this book.

Understanding Surgery. Edited and compiled by Robert E. Rothenberg, M.D. Cloth. $4.95. Pp. 620, with 103 illustrations by Sylvia and Lester V. Bergman. McGraw-Hill Company, Inc., 330 W. 42nd St., New York 36; 95 Farrington St., London, E.C.4, England; 253 Spadina Rd., Toronto, Canada, 1955.

This book was written for the laity. Clarity has been maintained throughout by the use of nontechnical terms and simple pen and ink drawings. Eight authors have collaborated on sections dealing with ocular surgery, otorhinolaryngology, neurosurgery, surgery of the neck and chest, abdominal surgery, urology, gynecology, orthopedics, and surgery of the superficial tissues. Unnecessary overlapping of subject material has been avoided. Although the technical material is excellent and timely, this is a glaring example of poor book making. The pages have been placed off center and the sentences seem to run up and down hill. It was indeed a strain on the eyes to attempt to read the book. It may be that the reviewer's copy was a bad one and that in later copies these faults have been corrected. The material contained in the book can be recommended to the lay reader.

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

QUERIES AND MINOR NOTES

PROGNOSIS WITH AURICULAR STANDSTILL

To the Editor:—*If sustained or prolonged auricular standstill, as demonstrated on the electrocardiogram, persists for more than a few seconds, what can be expected as to the prognosis and what would the etiology be suspected to be? Is this condition ever found in a situation where idioventricular rhythm has been established and in which the patient has survived for several weeks, months, or years?*

Roy W. Money, M.D., Pulaski, Tenn.

Answer.—The diagnosis of auricular standstill may be difficult to make electrocardiographically. It is assumed to be present when a nodal or idioventricular rhythm is present without visible P waves. However, differentiation must be made from nodal rhythm with P waves buried within the QRS complexes and from auricular fibrillation with complete atrioventricular block. When one labels a rhythm auricular standstill, it is assumed that there is complete sinus arrest, with block of retrograde conduction from the atrioventricular node, so that no impulse enters the auricular muscle from the nodal pacemakers. In addition, the auricular myocardium is markedly depressed, so that no auricular foci are set up. Auricular standstill has been produced experimentally after anoxemia, cooling of the sinus node, potassium poisoning, and carbon monoxide poisoning. Carotid sinus pressure, coronary ischemia, and rheumatic myocarditis are other etiological factors. The commonest clinical cause for this condition is overdosage with digitalis and quinidine. It generally occurs in elderly patients with congestive heart failure, severe coronary disease, and ischemia of the myocardium. It rarely occurs in the absence of organic heart disease. The auricular standstill is usually transient and generally occurs when arrhythmias, such as auricular fibrillation, are converted to normal sinus rhythm. Not infrequently, however, it may last for several hours or days. In one reported case, it lasted for 11 days. There is no reason why it cannot last longer.

The prognosis is poor. The majority of patients with auricular standstill die within several days or weeks, but this is probably the result of the severe organic heart disease and heart failure rather than the impaired auricular conduction. Treatment includes stopping the administration of digitalis and quinidine, if they are etiological factors, and administering atropine, ephedrine, or Isuprel. Potassium salts may help if overdosage of digitalis is a factor. The associated coronary ischemia and the cardiac failure must be treated.

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications and queries on postal cards cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

USE OF DIGESTIVE ENZYMES FOR EXUDATE OF OTITIS MEDIA

To the Editor:—*Ear pathology that progresses from an acute otitis media to a subacute or a chronic otitis media with the development of a thick exudate has been observed in children. After a myringotomy has been done and after this thick glue-like mucus has been aspirated from a child's ear, would it be harmful to inject an enzyme, such as Tryptar, in the middle ear?*

Ray M. Moose, M.D., San Bernardino, Calif.

Answer.—A digestive enzyme, such as Tryptar, or Caroid, a brand of digestive ferment derived from the Carica papaya, may be used to digest the thick mucus or the mucopurulent exudate of an acute, subacute, or chronic otitis media effectively and safely.

EXOPHTHALMOS WITH CONJUNCTIVAL EDEMA

To the Editor:—*What is the recent treatment for exophthalmos and conjunctival edema associated with toxic diffuse goiter (Graves' disease)?*

Henry G. Kurz, M.D., La Habra, Calif.

This inquiry was referred to two consultants, whose respective replies follow.—Ed.

Answer.—The common type of exophthalmos associated with toxic diffuse goiter is that which parallels the course of the hyperthyroidism. This is a benign form of exophthalmos which requires no special treatment other than correction of the hyperthyroidism. Exophthalmos that is accompanied by conjunctival edema, chemosis, and extraocular muscle palsy is more likely to be the progressive or malignant type. Wide variations in the course of the exophthalmos make it almost impossible to predict the eventual outcome in any particular case. Furthermore, the unpredictable course makes it extremely difficult to determine whether improvement in the exophthalmos is due to a spontaneous remission or to the therapy that happens to be in use at the time.

In general, there is no effective medical treatment for progressive exophthalmos. If hyperthyroidism is present, it should be corrected in a positive manner by subtotal thyroidectomy after preparation with antithyroid drugs or with radioiodine (I^{131}) if the patient is over 50 years of age. There is no conclusive evidence that progression of the exophthalmos is accelerated by the elimination of hyperthyroidism. It is true that exophthalmos may progress after correction of hyperthyroidism with antithyroid drugs, with thyroidectomy, or with I^{131}, but it is also true that exophthalmos has progressed severely in the presence of active hyperthyroidism. Elimination of hyperthyroidism is, therefore, the first step in the treatment of exophthalmos.

Care of the protruding eyes should include elevation of the head of the bed at night, protection of the cornea during the day by the use of glasses, warm compresses to the eyes three or four times a day, application of protective ointments at bedtime to avoid drying of the cornea, prompt, energetic treatment of conjunctival infection, and avoidance of excessive fatigue, excitement, or nervous tension. These measures are simply protective and do not alter the course of the exophthalmos. Treatment of exophthalmos with desiccated thyroid, triiodothyronine, cortisone, estrogens, pituitary, or orbital radiation has given such inconsistent results as to cast serious doubt on their value. If the course of the exophthalmos is steadily progressive and the degree of proptosis is such as to jeopardize the eyes, orbital decompression by surgery is indicated without delay.

ANSWER.—The bulk of accumulated evidence points to toxic diffuse goiter as being a thyrohypophysial syndrome, and there is much evidence to indicate that the pituitary gland is intimately connected with exophthalmos in this condition, although it is frequently dissociated from the size of the goiter or the degree of thyroid activity measurable.

Exophthalmos may appear before the occurrence of hyperthyroidism or in instances in which it is never detected. It frequently comes during increasing hyperthyroidism and not infrequently appears after its disappearance. It is thought to be due to hyperpituitarism associated with an excess ouput of thyroid-stimulating hormone or a closely connected factor, an exophthalmos-producing substance.

The types of treatment available include the following, most of which are designed to inhibit pituitary activity: It is considered good practice to correct hypothyroidism, and it is probably good practice to correct hypometabolism even though definite evidence of hypothyroidism is not present. The use of larger than physiological doses of desiccated thyroid or triiodothyronine have been tried in the past, with only mild success, but there are now a few instances on record in which prompt and marked improvement has followed the use of large doses of triiodothyronine.

Estrogens and androgens have been used as pituitary inhibitors, but in exophthalmos they have been of little or no practical value. Some patients in this country and in England have been treated with corticotropin (ACTH), cortisone, or hydrocortisone or with combinations of these. Records to date indicate that the response to these substances is not readily practicable. Though dramatic response may occur, the improvement may in some instances be great in the actual proptosis, but in most instances, as more results accumulated, the result is chiefly on soft-tissue swelling of lids and conjunctiva. In those instances in which corneal drying or beginning ulceration threatens, or the loss of an eye, orbital decompression (Naffziger's operation) may be necessary.

The method which has recently been highly successful in a few instances was reported first in 1942, namely, the production of hypopituitarism. A similar patient has recently been reported in the *Journal of Clinical Endocrinology and Metabolism* by M. Albeaux Fernet and co-workers, and other unpublished data indicate that hypopituitarism caused by surgery may be followed by almost complete disappearance of all eye signs associated with severe exophthalmos.

Local eye care and local operations may be useful. One of the most important points is to prevent dryness of the cornea. This can be helped by use of protective ointments at night and the wearing of shields over the eyes to maintain a moist atmosphere over the cornea. Skin divers' goggles are useful for this purpose. If the condition is fairly marked and stationary, covering of the eye may be assisted by tarsorrhaphy. For the associated diplopia, muscle surgery has some usefulness. It has to be postponed until the condition is stationary, and its usefulness is limited because of the type of change which has occurred within the affected muscle, rendering it relatively paralytic due to infiltration of leukocytes, mucopolysaccharides, and later with much associated fibrosis.

OCULAR EFFECTS OF ALCOHOL

TO THE EDITOR:—*It has been said that diminution of the visual field is among the first manifestations of physiological disturbances caused by alcohol in drivers of motor cars. Is the fact really proved, or, on the contrary, is it scientifically denied?*

H. Hinglais, M.D., Paris, France.

This inquiry has been referred to two consultants, whose respective replies follow.—ED.

ANSWER.—The classic eye sign of alcohol intoxication is the cecocentral scotoma characteristic of tobacco-alcohol amblyopia. There is some question whether the scotoma results from alcohol alone. No available text describes constriction of the visual field as an early manifestation of physiological disturbance caused by alcohol. Loss of visual acuity in tobacco-alcohol amblyopia is temporary and is recovered shortly after the use of tobacco is discontinued even though the use of alcohol is continued. Diminution in visual acuity occurs with optic neuritis and optic atrophy in methyl alcohol poisoning and may go into total permanent blindness. The first ocular manifestation of alcohol intoxication is diplopia and loss of judgment of distance. This disturbance is of more importance to drivers of motor cars than diminution of vision or constriction of the visual field.

ANSWER.—It is generally assumed that the effect of alcohol on the central nervous system is due to poisoning of tissue cells so that they are unable to use oxygen properly. In other words, a state analogous to tissue anoxia is produced and would explain the striking effects of alcohol on the central nervous system, since nervous tissue is very susceptible to oxygen want. The symptoms of anoxia in relation to vision are diminished visual acuity, constriction of the visual fields, reduction in retinal sensitivity, and increased fatiguability of the muscles of accommodation and convergence (Wilmer and Berens: *J. A. M. A.* **71**:1394-1398 [Oct. 26] 1918). A progressive loss in the visual fields with increasing lack of oxygen has also been reported by Evans and McFarland (*Am. J. Ophth.* **21**:968, 1938).

In studying the relationship of alcoholic intoxication and anoxemia, it has been shown that an excess of oxygen and carbon dioxide tended to sober up the subjects more rapidly and that they did better in psychological tests (McFarland and Barach: *Am. J. M. Sc.* **192**:186, 1936).

STEROID THERAPY AND SURGERY

To the Editor:—*Recently several articles have stated that, if a patient has had a course of steroid therapy and then has required a major surgical procedure even up to six months after the last dose of cortisone, he should be fortified with cortisone prior to and after the operation. Does this apply to corticotropin (ACTH) as well as cortisone and its derivatives? Just what is meant by having had cortisone therapy within six months of the surgical procedure? Does it mean at least one day or one week of steroid therapy? Does the amount of steroid given bear a lot of weight?*

Sidney W. Berezin, M.D., Spring Valley, N. Y.

Answer.—To date there are no available reports which indicate that the same prophylaxis must be taken with corticotropin as with cortisone. However, this should not be considered as conclusive until more time has elapsed.

If the patient has had any cortisone therapy within six months of the time of surgery, he should be fortified with cortisone. Although this is still questionable, present thinking is that it is a safe prophylactic measure. The amount of steroid necessary to produce a depression in adrenal function is still not known, since reactions differ in individuals. The amount of steroid given, however, should constitute a guide by which one may determine the amount of fortification necessary.

TOXICITY OF PHOTOGRAPHIC CHEMICALS

To the Editor:—*Have any toxic symptoms been noted in patients who work with any of the following substances: Elon, hydroquinone, Kodalk, potassium alum, potassium bromide, sodium carbonate, and sodium sulfite? Is there any special reference to anemia or bone-marrow depression?*

Morton I. Silverman, M.D., Allentown, Pa.

Answer.—The substances mentioned are commonly found in black-and-white photographic developers. There is no evidence of anemia or bone-marrow depression either in workers who manufacture or package the substances or in photographers who use them as developers. The only known toxic symptom is that of occasional contact dermatitis, which may result from continued contact with the alkaline developing solution or occasionally from a specific sensitivity. Accidental or suicidal ingestion of large amounts of mixtures of the solid developing agents has been known to give rise to acute hemolytic effects and symptoms resembling those of phenol intoxication. On the other hand, hydroquinone has been ingested in amounts as large as 300 to 500 mg. per day for several months without any effect on the blood picture in humans (Carlson and Brewer: *Proc. Soc. Exper. Biol. & Med.* **84**:684, 1953).

DIAGNOSIS AND TREATMENT OF PERNICIOUS ANEMIA

To the Editor:—*Regarding the query entitled "Diagnosis and Treatment of Pernicious Anemia" in* The Journal, *May 11, 1957, page 221, I notice that the inquirer requests an estimate of the number of patients who may have been treated for pernicious anemia, especially in rural districts, who have never been given a gastric test. I can contribute one such case, for I live in a rural area.*

Laboratory tests on a patient showed that he had a hemoglobin level below 7 Gm. per 100 cc., negative fecal occult blood, and suggestive pernicious anemia. There was a reduced vibration sensation of the feet and a history of "thin blood" several years previously with associated weakness. Inasmuch as free hydrochloric acid was found in the gastric secretion after the histamine test, the case of this patient was apparently one of the rare instances in which pernicious anemia has existed with free hydrochloric acid in the stomach. The hemoglobin level was raised to more than 12 Gm. per 100 cc. through no other therapy than parenterally administered vitamin B_{12}. The patient also had a striking improvement in the vibration sensation of the feet. During this period he ingested no more liver than would occasionally be included in his ordinary diet.

P. Evans Adams, M.D., Norlina, N. C.

The above comment was referred to the consultant who answered the original query, and his reply follows.—Ed.

To the Editor:—*There certainly are few patients with pernicious anemia who have free hydrochloric acid but not enough intrinsic factor in their gastric juice to insure adequate absorption of vitamin B_{12} from the gastrointestinal tract. This consultant, however, has seen two such patients. Moreover, about 35 to 50 such patients have been described in the literature, but not all of these have been thoroughly studied. The patient described by the physician writing the comment may well represent another example. There are only a few other situations in which improvement following injections of vitamin B_{12} would have been so dramatic. On the other hand, the condition is so rare that it is quite justifiable to regard the presence of free hydrochloric acid in the gastric secretion as ordinarily ruling out a diagnosis of pernicious anemia. One formerly could prove the absence of intrinsic factor only by collecting the gastric juice and assaying it for intrinsic factor. Now one can give a standard dose of radioactive vitamin B_{12} and demonstrate that it is absorbed poorly unless a source of intrinsic factor is administered along with the radioactive B_{12}.*

One cautionary comment, however, should be made. Vitamin B_{12}-responsive megaloblastic anemia may occur in association with certain diseases or abnormalities of the intestinal tract. In these conditions free hydrochloric acid is often present in the gastric contents. That is true of idiopathic steatorrhea or nontropical sprue. The absence of diarrhea does not exclude this possibility, and the anemia may respond to vitamin B_{12} as well as to folic acid.

The megaloblastic anemia due to fish-tapeworm or Ascaris infestation will be corrected by the administration of vitamin B_{12}; free hydrochloric acid is occasionally found in the gastric juice. One may rarely see a strict vegetarian who has a dietary deficiency of vitamin B_{12}. The megaloblastic anemia seen with intestinal strictures, anastomoses, or massive diverticula of the small intestine usually responds better to folic acid but may at times show improvement after therapy with parenterally administered vitamin B_{12}. The fact that the patient described in the comment above responded to injections of vitamin B_{12}, therefore, indicates that he probably had a vitamin B_{12} deficiency, but it does not necessarily prove that he has true pernicious anemia. Additional studies would be necessary to provide that evidence. For a report of such an investigation see the article by Harris-Jones and associates (Blood **12**:461, 1957).

WESTERGREN SEDIMENTATION RATE TECHNIQUE

To the Editor:—*In the Queries and Minor Notes section of* The Journal *for May 25, 1957, page 509, there is a comment regarding the correct normals for the Westergren method of determining the sedimentation rate of erythrocytes.*

Clay-Adams, Inc., manufacturer of laboratory supplies, had occasion in 1956 to recheck its standards and literature on this subject. After extensive investigations and consultations with several hematologists, it was decided that our old instructions were incorrect insofar as normals were concerned, and these were changed to agree with the limits of sedimentation rate advocated by Westergren. Westergren gives a normal range of 1 to 3 mm. sedimentation after one hour for men and 4 to 7 mm. sedimentation after one hour for women (Acta med. scandinav. **139**:214, 1951). *Ham gives the same normal range limits which are based on a dilution rate of 1 part of sodium citrate (3.8% solution) to 4 parts of blood. Where the dilution rate is reduced to 1 part of sodium citrate solution to 8 or 9 parts of blood, the normal sedimentation rate is given as 0 to 15 mm. after one hour for men and 0 to 20 mm. after one hour for women (Todd and Sanford: Clinical Diagnosis by Laboratory Methods, Philadelphia, W. B. Saunders Company, 1948).*

Gradwohl appears to be incorrect. He suggests a dilution of 0.4 cc. of sodium citrate solution to 1.6 cc. of blood, or 1 to 4, then gives the normals for a dilution rate of 1 to 8 (Gradwohl: Clinical Laboratory Methods and Diagnosis, ed. 5, St. Louis, C. V. Mosby Company, 1956, vol. 1, p. 961).

Helpful references to this same question appeared in the Queries and Minor Notes section of The Journal *for March 23, 1940, page 1101, and again for Dec. 3, 1955, page 1422.*

Dewey H. Palmer
Director of Product Development
Clay-Adams, Inc.
141 E. 25th St.
New York 10.

CONSTANT PERSPIRATION OF THE HANDS

To the Editor:— *In* The Journal, *June 29, 1957, page 1040, I notice the answer to the query entitled "Constant Perspiration of the Hands." This condition of hyperhidrosis can be completely disabling for certain individuals, and when the condition cannot be controlled with conservative medical measures, the operation of thoracic sympathectomy is indicated. This operation has been performed for many years for hyperhidrosis involving the upper extremities. The operation of bilateral second thoracic ganglionectomy can also be performed with little risk; this does not produce bilateral Horner's syndrome, which will be produced if a stellate ganglionectomy is performed.*

J. Grafton Love, M.D.
Mayo Clinic
Rochester, Minn.

The above comment was referred to the consultant who answered the original query, and his reply follows.—Ed.

To the Editor:—*Few cases of hyperhidrosis of the hands are so severe and so resistant to conservative management as to make sympathectomy necessary. While this procedure is successful in drying the hands, dermatologists see more trouble from dry skin than from hyperhidrosis. It is necessary to open the chest bilaterally to perform this operation, and there are possible complications. Most local neurosurgeons require from two to three hours for the procedure; it may be necessary to do it in two stages. This is a major procedure for a minor condition. Many question the advisability of performing major surgery for a psychosomatic manifestation. Certainly, sympathectomy should be reserved as a last resort in the treatment of hyperhidrosis of the hands.*

CANDIDA OVERGROWTH FOLLOWING ANTIBIOTIC THERAPY

To the Editor:—*The reply of the second consultant to the query regarding pruritus following Terramycin therapy in* The Journal, *June 22, 1957, page 940, was very erudite, but the ointment recommended would be very expensive. The San Diego price for 10 Gm. of prednisone to be added to the salve advised would be about $100. Could there have possibly been a misprint in the recommended dosage?*

James E. Reeves, M.D.
205 Walnut Ave.
San Diego 3, Calif.

The above comment was referred to the consultant who answered the original query, and his reply follows.—Ed.

To the Editor:—*The addition of 10 Gm. of prednisone (Meticorten) was an obvious error. What was meant was 10 Gm. of 0.5% prednisolone cream (Meti-Derm) or 5 Gm. of 2.5% hydrocortisone acetate with neomycin sulfate (Neo-Cortef) or a similar hydrocortisone-like product to yield 34 Gm. of salve.*

JOURNALS ABSTRACTED IN THE CURRENT MEDICAL LITERATURE DEPARTMENT, MAY-AUGUST 1957

Abstracts have been made of important articles in the following journals in the Current Medical Literature Department of THE JOURNAL during the past four months. Any of the journals, except those starred, will be lent by the Library of the American Medical Association to individuals in Continental United States and Canada who subscribe to its scientific periodicals and to members of the American Medical Association and its student organization. No charge is made to members, but the fee for other borrowers is 15 cents in stamps for each periodical. Three journals may be borrowed at a time for a period not exceeding five days. Thus most of these journals are accessible to the general practitioner.

*A. M. A. Archives of Dermatology. Chicago.
*A. M. A. Archives of Internal Medicine. Chicago.
*A. M. A. Archives of Neurology and Psychiatry. Chicago.
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*A. M. A. Archives of Otolaryngology. Chicago.
*A. M. A. Archives of Pathology. Chicago.
*A. M. A. Archives of Surgery. Chicago.
*A. M. A. Journal of Diseases of Children. Chicago.
Acta chirurgica scandinavica. Stockholm.
Acta dermato-venereologica. Stockholm.
Acta endocrinologica. Copenhagen.
Acta haematologica. Basel.
Acta medica et biologica. Niigata, Japan.
Acta medica italica di malattie infettive e parassitarie. Rome.
Acta medica scandinavica. Stockholm.
Acta neurologica latinoamericana. Buenos Aires.
Acta obstetricia et gynecologica scandinavica. Stockholm.
Acta oto-laryngologica. Stockholm.
Acta paediatrica. Uppsala.
Acta paediatrica belgica. Brussels.
Acta pathologica et microbiologica scandinavica. Copenhagen.
Acta radiologica. Stockholm.
Acta tuberculosea belgica. Brussels.
Acta tuberculosea scandinavica. Copenhagen.
Acta urologica belgica. Brussels.
Acta vitaminologica. Milan.
Aggiornamenti sulle malattie da infezione. Rome.
American Heart Journal. St. Louis.
American Industrial Hygiene Association Quarterly. Chicago.
American Journal of Anatomy. Philadelphia.
American Journal of Clinical Nutrition. New York.
American Journal of Clinical Pathology. Baltimore.
American Journal of Digestive Diseases. New York.
American Journal of Gastroenterology. New York.
American Journal of Hygiene. Baltimore.
American Journal of the Medical Sciences. Philadelphia.
American Journal of Medical Technology. Houston.
American Journal of Medicine. New York.
American Journal of Obstetrics and Gynecology. St. Louis.
American Journal of Ophthalmology. Chicago.
American Journal of Psychiatry. New York.
American Journal of Public Health. Albany, New York.
American Journal of Roentgenol. and Radium Therapy. Springfield, Ill.
American Journal of Surgery. New York.
American Journal of Tropical Medicine and Hygiene. Baltimore.
American Review of Tuberculosis. New York.
American Surgeon. Baltimore.
Anaesthesia. London.
Anaesthesist. Berlin.
Anatomical Record. Philadelphia.
Anales de la Facultad de medicina de Montevideo. Montevideo.
Angiology. Baltimore.
Annales d'endocrinologie. Paris.
Annals of Human Genetics. London.
Annals of Internal Medicine. Lancaster, Pa.
Annales de médecine. Paris.
Annales medicinae internae Fenniae. Helsinki.
Annales d'oculistique. Paris.
Annales d'oto-laryngologie. Paris.
Annals of Otology, Rhinology and Laryngology. St. Louis.
Annali di ottalmologia e clinica oculistica. Genoa.
Annales paediatrici. Basel.
Annales Paediatriae Fenniae. Helsinki.
Annals of the Rheumatic Diseases. London.
Annals of Surgery. Philadelphia.
Archivio "E. Maragliano" di patologia e clinica. Genoa.
Archiv für Geschwulstforschung. Leipzig.
Archiv für Gewerbepathologie und Gewerbehygiene. Berlin.
Archivos del Instituto de cardiologia de Mexico. Mexico, D. F.
Archives internationales de pharmacodynamie et de thérapie. Ghent.
Archiv für klinische Chirurgie. Berlin.
Archiv für klinische und experimentalle Dermatologie. Berlin.
Archives of Disease in Childhood. London.
Archives des maladies du coeur et des vaisseaux. Paris.
Archives des maladies professionnelles, de médecine du travail et de sécurité sociale. Paris.

* Cannot be lent.

Archiv für Ohren- Nasen- und Kehlkopfheilkunde. Berlin.
Archiv für orthopädische und Unfall-Chirurgie. Munich.
Archives of Physical Medicine and Rehabilitation. Chicago.
Archivio di scienze biologiche. Bologna.
Archivio per le scienze mediche. Turin.
Archivio di tisiologia e delle malattie dell'apparato respiratorio. Naples.
Archivos uruguayos de medicina, cirugia y especialidades. Montevideo.
Arizona Medicine. Phoenix, Arizona.
Arquivo de patologia. Lisbon.
Australian & New Zealand Journal of Surgery. Melbourne.
Arztliche Wochenschrift. Berlin.
Australasian Annals of Medicine. Sydney.
Beiträge zur klinischen Chirurgie. Munich.
Belgische tijdschrift voor geneeskunde. Leuven.
Bibliotek for laeger. Copenhagen.
Blood. New York.
Blut. Munich.
Boletin de la Asociación médica de Puerto Rico. Santurce.
Bollettino e memorie della Societa tosco-umbra di chirurgia. Florence.
Bordeaux chirurgical. Bordeaux.
Brain. London.
British Heart Journal. London.
British Journal of Anaesthesia. Altrincham.
British Journal of Clinical Practice. London.
British Journal of Dermatology. London.
British Journal of Industrial Medicine. London.
British Journal of Plastic Surgery. Edinburgh.
British Journal of Radiology. London.
British Journal of Surgery. Bristol.
British Journal of Tuberculosis and Diseases of the Chest. London.
British Journal of Urology. Edinburgh.
British Journal of Venereal Diseases. London.
British Medical Journal. London.
Bulletin of the New York Academy of Medicine. New York.
Bulletin de la Société royale belge de gynecologie et d'obstétrique. Brussels.
Bulletin of the World Health Organization. Geneva.
California Medicine. San Francisco.
Canadian Journal of Biochemistry and Physiology. Ottawa.
Canadian Journal of Microbiology. Ottawa.
Canadian Journal of Public Health. Toronto.
Canadian Medical Association Journal. Montreal.
Canadian Services Medical Journal. Ottawa.
Cancer. Philadelphia.
Cardiologia. Basel.
Cardiologia pratica. Florence.
Cervello. Naples.
Chinese Medical Journal. Peking.
Chirurg. Berlin.
Chirurgia italiana. Belluno.
Chirurgia toracica. Rome.
Circulation. New York.
Cirugia, ginecologia y urologia. Madrid.
Clinica pediatrica. Bologna.
Clinical Science. London.
Connecticut State Medical Journal. New Haven, Conn.
Cuore e circolazione. Rome.
Danish Medical Bulletin. Copenhagen.
Delaware State Medical Journal. Farnhurst, Del.
Dermatologica. Basel.
Deutsche medizinische Wochenschrift. Stuttgart.
Deutsche Zeitschrift für die gesamte gerichtliche Medizin. Berlin.
Diabetes. New York.
Die Medizinische. Stuttgart.
Diseases of the Chest. Chicago.
East African Medical Journal. Nairobi.
Electroencephalography and Clinical Neurophysiology. Montreal.
Eye, Ear, Nose & Throat Monthly. Chicago.
Fertility and Sterility. New York.
Folia cardiologica. Milan.
Folia hereditaria et pathologica. Milan.
Folia medica. Naples.
Fortschritte auf dem Gebiete der Röntgenstrahlen und der Nuklearmedizin. Stuttgart.
Fortschritte der Neurologie, Psychiatrie und ihrer Grenzgebiete. Stuttgart.
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Harefuah. Tel-Aviv.
Hawaii Medical Journal. Honolulu.
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Indian Journal of Pediatrics. Calcutta.
International Archives of Allergy and Applied Immunology. Basel.
International Journal of Anesthesia. Baltimore.
International Journal of Leprosy. New Orleans.
Irish Journal of Medical Science. Dublin.
Journal of Allergy. St. Louis.
Journal of the American Dietetic Association. Chicago.
Journal of the American Geriatrics Society. Baltimore.
Journal of the American Medical Women's Association. New York.
Journal of Applied Physiology. Washington, D. C.
Journal of Aviation Medicine. St. Paul.
Journal of Biological Chemistry. Baltimore.
Journal of Biophysical and Biochemical Cytology. Baltimore.
Journal de chirurgie. Paris.
Journal of the Christian Medical Association of India. Calcutta.
Journal of Chronic Diseases. St. Louis.
Journal of Clinical Endocrinology and Metabolism. Springfield, Ill.
Journal of Clinical and Experimental Psychopathology and Quarterly Review of Psychiatry and Neurology. New York.
Journal of Clinical Investigation. New York.
Journal of Clinical Pathology. London.
Journal of the Faculty of Radiologists. Bristol.
Journal of the Florida Medical Association. Jacksonville.
Journal of Hygiene. London.
Journal of the Indian Medical Association. Calcutta.
Journal of the Indiana State Medical Association. Indianapolis.
Journal of Infectious Diseases. Chicago.
Journal of International College of Surgeons. Chicago.
Journal of Investigative Dermatology. Baltimore.
Journal of Iowa State Medical Society. Des Moines.
Journal of the Irish Medical Association. Dublin.
Journal of Kansas Medical Society. Topeka.
Journal of the Kentucky State Medical Association. Louisville.
Journal of Laboratory and Clinical Medicine. St. Louis.
Journal-Lancet. Minneapolis.
Journal of Laryngology and Otology. London.
Journal of the Louisiana State Medical Society. New Orleans.
Journal of the Maine Medical Association. Brunswick.
Journal of the Medical Association of Georgia. Atlanta.
Journal de médecine de Lyon. Lyon.
Journal of Michigan State Medical Society. St. Paul.
Journal of the Mount Sinai Hospital. New York.
Journal of the National Cancer Institute. Washington, D. C.
Journal of Neurology, Neurosurgery and Psychiatry. London.
Journal of Neuropathology and Experimental Neurology. New York.
Journal of Neurosurgery. Springfield, Ill.
Journal of Nutrition. Philadelphia.
Journal of Obstetrics and Gynaecology of the British Empire. London.
Journal of the Pakistan Medical Association. Karachi.
Journal of Pathology and Bacteriology. Edinburgh.
Journal of the Philippine Medical Association. Manila.
Journal of Physiology. London.
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Journal of Thoracic Surgery. St. Louis.
Journal of Tropical Pediatrics. New Orleans.
Journal d'urologie médicale et chirurgicale. Paris.
Journal of Urology. Baltimore.
Khirurgiya. Moscow.
Klinische Medizin. Vienna.
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Klinische Wochenschrift. Berlin.
Lancet. London.
Laryngoscope. St. Louis.
Leprosy Review. London.
Lille Chirurgical. Lille.
Maandschrift voor kindergeneeskunde. Leyden.
Maryland State Medical Journal. Baltimore.
Medical Annals of the District of Columbia. Washington, D. C.
Medical Journal of Australia. Sydney.
Medical Journal of Malaya. Singapore.
Medical Officer. London.
Medical Record and Annals. Houston.
Medicina del lavoro. Milan.
Medicine. Baltimore.
Mémoires de l' Academie de chirurgie. Paris.
Military Medicine. Washington, D. C.
Minerva anestesiologica. Turin.
Minerva cardioangiologica. Turin.
Minerva cardioangiologica europea. Turin.
Minerva chirurgica. Turin.
Minerva dermatologica. Turin.
Minerva ginecologica. Turin.
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Minerva ortopedica. Turin.
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Mississippi Doctor. Booneville, Miss.
Missouri Medicine. St. Louis.
Monatsschrift für Kinderheilkunde. Berlin.
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Nederlandsch tijdschrift voor geneeskunde. Haarlem.
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North Carolina Medical Journal. Winston-Salem.
Northwest Medicine. Seattle.
Nova Scotia Medical Bulletin. Halifax, N. S.
Obstetrics and Gynecology. New York.
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Oral Surgery, Oral Medicine and Oral Pathology. St. Louis.
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Pediatrie. Lyon.
Pennsylvania Medical Journal. Harrisburg.
Plastic & Reconstructive Surgery. Baltimore.
Policlinico (sezione medica). Rome.
Policlinico (sezione pratica). Rome.
Postgraduate Medicine. Minneapolis.
Practitioner. London.
Prensa medica argentina. Buenos Aires.
Presse médicale. Paris.
Proceedings of the Royal Society of Medicine. London.
Proceedings of Staff Meetings of Mayo Clinic. Rochester, Minn.
Psychiatria et neurologia. Basel.
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Psychoanalytic Quarterly. New York.
Psychosomatic Medicine. New York.
Public Health Reports. Washington, D. C.
Punjab Medical Journal. Jullundur City.
Quarterly Bulletin, Northwestern University Medical School. Chicago.
Quarterly Journal of Medicine. Oxford.
Quarterly Journal of Studies on Alcohol. New Haven.
Radiologia medica. Turin.
Radiology. Syracuse, N. Y.
Rassegna medica sarda. Cagliari.
Rassegna di studi psichiatrici. Siena.
Research Quarterly. Washington, D. C.
Revista argentina de cardiología. Buenos Aires.
Revista argentina de urología. Buenos Aires.
Revue belge de pathologie et de médecine expérimentale. Brussels.
Revista española de pediatria. Saragossa.
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Revista clínica española. Madrid.
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Revue d'hématologie. Paris.
Revue de laryngologie, otologie, rhinologie. Bordeaux.
Revista médica de Chile. Santiago.
Revue médicale de Liège. Liège.
Revista de neuro-psiquiatria. Lima.
Revista paulista de medicina. São Paulo.
Revue du praticien. Paris.
Riforma medica. Naples.
Rivista clinica pediatrica. Florence.
Rivista italiana di igiene. Pisa.
Rivista di medicina aeronautica. Rome.
Rivista di neurologia. Naples.
Rivista di ostetricia e ginecologia. Florence.
Rocky Mountain Medical Journal. Denver.
Santo Tomas Journal of Medicine. Manila.
Scandinavian Journal of Clinical & Laboratory Investigation. Oslo.
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Schweizerische Zeitschrift für Tuberkulose und Pneumonologie. Basel.
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Semaine médicale. Paris.
Sight-Saving Review. New York.
South African Medical Journal. Cape Town.
Southern Medical Journal. Birmingham, Ala.
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Texas State Journal of Medicine. Austin.
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Toulouse Médical. Toulouse.
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Tuberkulosearzt. Stuttgart.
Ugeskrift for laeger. Copenhagen.
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University of Michigan Medical Bulletin. Ann Arbor.
United States Armed Forces Medical Journal. Washington, D. C.
Urologia. Treviso.
Valsalva. Rome.
Virginia Medical Monthly. Richmond.
West Virginia Medical Journal. Charleston.
Western Journal of Surgery, Obstetrics and Gynecology. Portland, Ore.
Wiener klinische Wochenschrift. Vienna.
Wiener medizinische Wochenschrift. Vienna.
Wiener Zeitschrift für Nervenheilkunde und deren Grenzgebiete. Vienna.
Wisconsin Medical Journal. Madison.
Zeitschrift für die gesamte innere Medizin. Leipzig.
Zentralblatt für Gynäkologie. Leipzig.
Zeitschrift für Kinderheilkunde. Berlin.
Zeitschrift für Orthopädie und ihre Grenzgebiete. Stuttgart.
Zeitschrift für Tropenmedizin und Parasitologie. Stuttgart.

SUBJECT INDEX

The letters used to explain in which department the matter indexed appears are as follows: "E," Editorial; "C," Correspondence; "ab," abstracts; the asterisk (*) indicates an original article in THE JOURNAL.

This is a subject index and one should, therefore, look for the subject word with the following exceptions: Foundations, Lectures, Moving Pictures, and Prizes, under "F," "L," "M," and "P" respectively. "Book Reviews," "Deaths," "Medicolegal Abstracts" and "Societies" are indexed under these titles at the end of the letters "B," "D," "M," and "S." Matter pertaining to the Association is indexed under "American Medical Association." The name of the author, in brackets, follows the subject entry.

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Am.—*American*
A.—*Association*
Coll.—*College*
Comm.—*Commission*
Comm.—*Committee*
Conf.—*Conference*
Cong.—*Congress*
Dist.—*District*
Div.—*Division*
Found.—*Foundation*
Hosp.—*Hospital*
Indust.—*Industrial*
Inst.—*Institute*
Internat.—*International*
M.—*Medical*
Med.—*Medicine*
Nat.—*National*
Pharm.—*Pharmaceutical*
Phys.—*Physicians*
Soc.—*Society*
Surg.—*Surgery*
Surgs.—*Surgeons*
S.—*Surgical*

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